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THE AMERICAN VOCATIONAL ASSOCIATION CONVENTION

The tenth annual convention of the American Vocational Association will be held at Chicago on December 4, 5, 6, and 7, 1935.

Chicago is admirably suited for a convention of this kind, as it has many things to offer to the visiting teacher. There are numerous interesting schools, colleges, universities, libraries, museums, institutions, industries, manufacturing plants and commercial enterprises that may be visited. There also are many beautiful parks for those who want to do sight-seeing. Best of all, however, there is the American Vocational Association Convention itself with its general sessions and round-table discussions. Then, too, there is the opportunity to meet old and make new friends, in general, to draw inspiration and enthusiasm for carrying on for another year.

It must be remembered that the convention cannot be a real success unless every member who can possibly get away from his school makes up his mind to attend. It is to be hoped that each reader of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION appoints himself as a committee of one who will induce as many of his fellow teachers as possible to accompany him on his trip to the American Vocational Association convention.

Don't forget the dates — December 4, 5, 6, and 7, 1935.

THIS MONTH'S COVER

The picture on the cover this month shows how flumes are used in the lumbering industry. The flumes are artificial channels built of wood through which water is conducted to float the logs.

The picture shows the flumes of the Madera Sugar Pine Company, Sierra National Forest, California. (Photo courtesy U. S. Forest Service.)

Articles Indexed—The articles contained in the Magazine are regularly indexed in "The Reader's Guide to Periodical Literature," and "Education Index."

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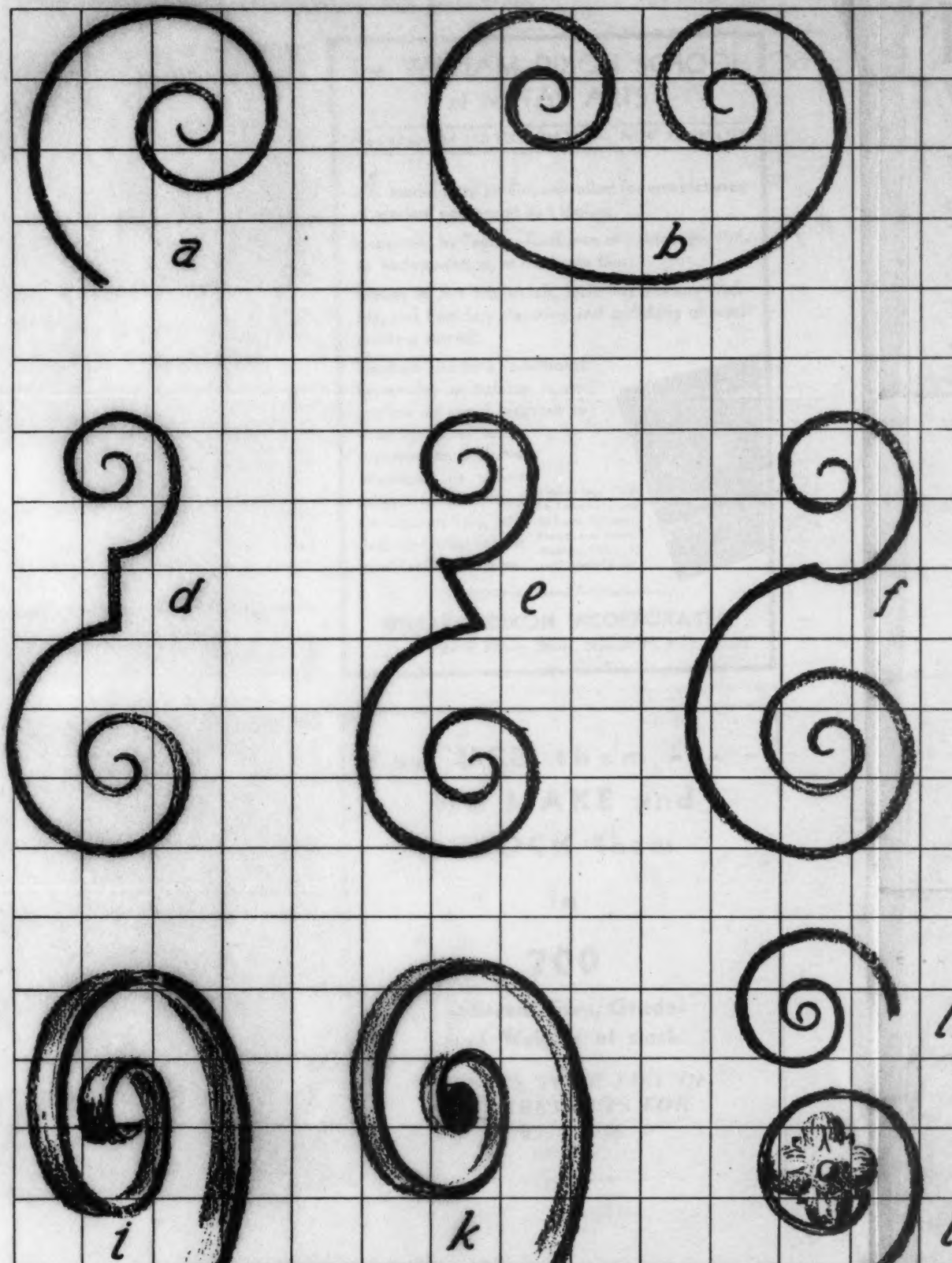

Chart I — The Art of Metal Working—I, by C. Weiler,

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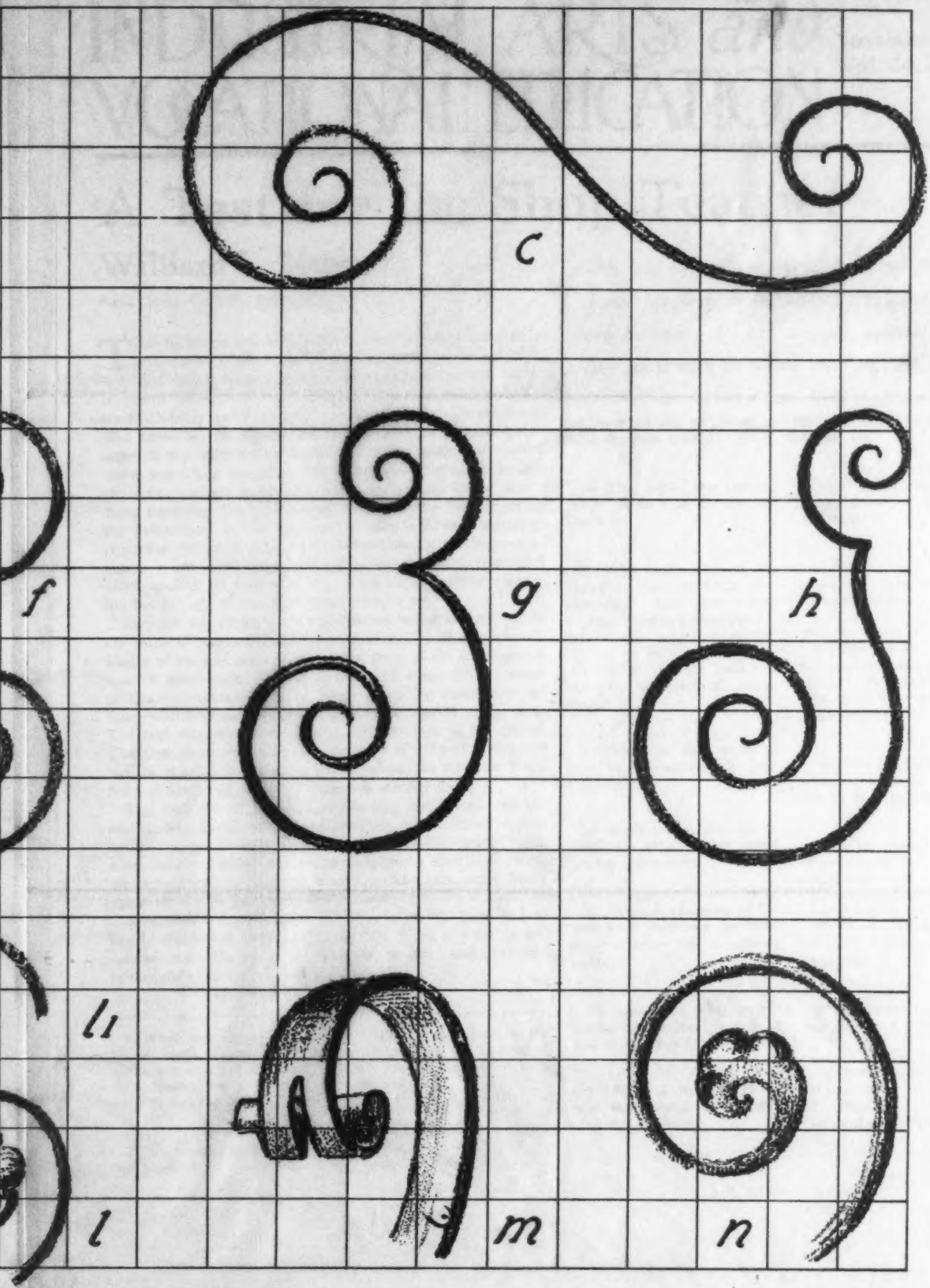

-I, by C. Weller, New York City. (See page 334)

INDUSTRIAL ARTS and VOCATIONAL EDUCATION
November, 1935
Vol. 24, No. 11

A Test for the Shop Teacher

William L. Hunter

Iowa State College, Ames, Iowa

This test of general knowledge and professional interest in industrial-arts education can be taken by the teacher himself. The key for it may be found on page 350.

THE following test will be of interest to many industrial-arts teachers. The value of the test rests on the assumption that industrial-arts teachers should know certain facts. It seems reasonable, for instance, that an industrial-arts teacher who is really interested in his profession should know who some of the leaders are in his field, he should know some of the outstanding books and their authors, he should know something regarding the materials with which industrial-arts teachers ordinarily work, he should know something regarding the outstanding industrial-arts teacher-training institutions of the country, he should know something regarding the tools with which industrial-arts teachers commonly work, something regarding the scientific principles often applied by industrial-arts teachers, something regarding the history of our movement, and so on.

The test was given to 34 experienced industrial-arts teachers from 14 states of the United States. The calculated reliability of the test was .97. The mean score of the whole group was 78 items right. The mean score of those with 5 years or less of experience was 71 items right. The mean score of those with 6 years or more of experience was 86 items right. The test requires about 1 hour and 15 minutes for giving. The test items are arranged in order of difficulty and can well be divided into two forms by taking the odd test items for one form and the even items for another form.

The best use of the test is probably not to see whether one student knows more than another, but it rather should be used to point out to the student that the business of being a first-rate industrial-arts teacher requires a man who knows much, and who is eager to learn anything that might be of value to him in his professional career.

Directions: Answer each of the following questions as briefly and yet as definitely as you can. Work at your normal rate of speed. Do not hurry. You will be given sufficient time to complete the test. *Please write legibly.*

(For Scoring Key see page 350)

1. What was the early system of trade training called in which a youth was indentured to a master for a period of years in order to learn a trade?

.....

2. What material is used to thin shellac?

.....

3. What is the standard height of a library table?

.....

4. For what woodworking tool is Henry Disston and Sons famous?

.....

5. What is the name for the Swedish system of training in which wood-carving was a chief feature?

.....

6. What early American statesman and diplomat is famous for his work as a printer?

.....

7. What kind of electricity is produced by friction?

.....

8. Who is the author of *Essentials of Woodworking?*

.....

9. In what city and state is Stout Institute located?

.....

10. What do the letters "S2S" signify to the woodworker?

.....

11. What is the name of the company that publishes the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION MAGAZINE?

.....

12. What is the unit of measure of electrical resistance?

.....

13. What is the revolving part of an automobile generator called?

.....

14. What is the chief use to which the shop worker would put sal ammoniac?

.....

15. What is the name of the tool made especially for turning the edge of a cabinet scraper?

.....

16. In a house, what are the horizontal members called to which the floor is nailed?

.....

17. What is the name of the professional magazine published at Peoria, Illinois?

.....

18. With what is the name of Chippendale associated in your mind?

.....

19. Who is the author of *The Instructor, the Man and the Job?*

.....

20. What man is famous for his work with instruction sheets?

.....

21. With what, in your mind, is the name of Hepplewhite associated?

.....

22. What kind of solder would you use to repair a broken band-saw blade?

.....

23. When a set of examination papers is arranged in rank order from poorest to best, what is the score of the middle paper called?

.....

24. Give the name of a man who is famous for his work in history of industrial education?

.....

25. With what educational institution is Robert W. Selvidge associated?

.....

26. With what publishing firm is William T. Bawden associated?

.....

27. Of what metal is the container of a dry-cell made?

.....

28. What topic is associated in your mind with the names of Rockford, Illinois, and Grand Rapids, Michigan?

.....

29. What is the name for a rectangular groove cut across a board?

.....

30. What topic comes to your mind when the names of Van Duzee, Wells, Newkirk, and Hunter are mentioned?

.....

31. What topic comes to your mind when the names of Selvidge and Allen are mentioned?

32. What is the name for an unusual growth on a tree from which figured veneers are cut?

33. In what city and state is Bradley Polytechnic Institute located?

34. What size and kind of nails would you use to nail 1-in. sheeting to the rafters of a building?

35. In what section of the United States do cypress trees grow chiefly?

36. Of what wood are baseball bats most commonly made?

37. With what educational institution is Homer J. Smith associated?

38. What acid is used in making storage-battery electrolyte?

39. What is the name given to the points of a ruling pen?

40. What is the unit called which is defined as 33,000 foot-pounds of work per minute?

41. In order to make soldering flux, what metal is added to muriatic (hydrochloric) acid?

42. What is the part of a jack plane called to which the plane iron is secured, and which can be moved back and forth slightly for various widths of throat opening?

43. Who wrote *How to Teach a Trade?*

44. In the United States what is the chief article made of lemonwood by industrial-arts pupils?

45. What kind of paper is usually used for letterheads?

46. Who is co-author, with Brown, of *Instructional Units in Hand Woodwork?*

47. What is the wirelike device called which is used to secure a castellated nut to a bolt?

48. In which industrial-arts subject is an Underwriter's knot commonly used?

49. What gauge galvanized wire would you choose for an outdoor clothesline?

50. What company manufactures the Bailey jack plane?

51. With what do you associate the name of Samuel Gompers?

52. In what city is Lussky, White and Coolidge, Inc., located?

53. What kind of equipment would an industrial-arts teacher be likely to order from Keuffel and Esser?

54. In what city did the American Vocational Association meet last year?

55. How many board feet in three boards ¾ by 8 in. by 6 ft.?

56. What is the chief use to which nichrome wire is put?

57. What is the essential difference between tool steel and mild steel?

58. In what city and state does the Frank Paxton Lumber Company have its headquarters?

59. With the teacher-training work in which state is Emanuel E. Ericson associated?

60. What name (other than battery tester) is given to the instrument used to test the strength of storage-battery solution?

61. To what magazine is Emanuel E. Ericson a regular contributor?

62. What is the name for the distance which an ordinary nut travels along the axis of a screw in one revolution?

63. With what metal is iron coated to make galvanized iron?

64. What is the name for the ratio of the weight of a substance to the weight of the same volume of water?

65. What is the original name given to the magazine which later became the *Industrial Education Magazine?*

66. In what city and state is the Bruce Publishing Company located?

67. What is the part of a file called which fits into the handle?

68. What is the recess called into which the glass fits in the back of picture-frame molding?

69. Fifty-fifty solder is made of what metals?

70. What term is used to describe the taper given to a pattern to enable it to be easily withdrawn from the mold?

71. Who is an outstanding living American educational philosopher?

72. What do you associate with the names of Ermeling, Fischer, and Greene?

73. With what educational institution is John Dewey associated?

74. With what in your mind is the name of William H. Kilpatrick associated?

75. In electricity, what is the unit of electrical pressure called?

76. What is the name for the occurrence when an electrical current in one wire sets up a current in a nearby wire?

77. What is the name for the plate or shield around a keyhole?

78. Give the title of a book of which William H. Varnum is the author.

79. With what educational institution is David Snedden associated?

80. What does the number on the heel of a hand saw indicate?

81. For what industrial-arts subject has Geo. A. Willoughby written several texts?

82. Where is William Hood Dunwoody Industrial Institute located?

83. Who is co-author, with Vaughn, of *Content and Methods of the Industrial Arts?*

84. In what section of the United States do the sequoias grow?

85. At what educational institution did Frederick G. Bonser work immediately prior to his death?

86. In what kind of pictorial drawing will the draftsman ordinarily draw the three visible faces of a cube all the same shape and the same size?

87. What topic comes to your mind when the names of Bobbitt and Charters are mentioned?

88. Who is co-author, with Svensen, of *Mechanical Drawing for High Schools?*

89. Who is the author of *Principles of Woodworking* published by The Bruce Publishing Company?

90. What comes to your mind when the names of Stenquist and McQuarrie are mentioned?

91. What is the class name

for bi- or multi-metallic materials such as the following: bronze, German silver, nichrome, babbitt, stainless steel?

92. Who is co-author, with Selvidge, of *Principles of Trade and Industrial Teaching?*

93. Give the title of a woodworking text of which William Noyes is the author.

94. With what educational institution is William E. Warner associated?

95. With a No. 10–24 machine screw, what does the "24" indicate?

96. What chemical element is the basis of graphite?

97. What use would the industrial-arts teacher have for potassium dichromate?

98. What is the heat-treatment process called by which a thin, hard outside layer is produced on low-carbon steel?

99. With what educational institution is Clyde A. Bowman associated?

100. What physical property of iron allows it to be drawn into a wire?

101. In what year was the Smith-Hughes law enacted?

102. What is the title of the industrial-arts book written by Newkirk and Stoddard?

103. In what city and state is Carnegie Institute of Technology located?

104. What kind of tool do you associate with the name of Russell Jennings?

105. With what educational institution is Arthur B. Mays associated?

106. What company, which specializes in the manufacture of machine lathes, has a booklet on *How to Run a Lathe* together with job sheets and plans of problems?

107. In what city and state is the Metropolitan Museum of Art located?

108. With what educational institution are Brown and Tustison associated?

109. What is the man's name who introduced manual training in the public schools of St. Louis?

110. A building is 64 ft. long. One side of the building is represented on a drawing by a line 12 in. long. What scale was used?

111. What Swiss teacher is often spoken of as the "Father of Manual Training"?

112. Four of the seven are: health, command of fundamental processes, worthy home membership, and vocation. What are the remaining three?

113. Who is co-author, with McGee, of *Instructional Units in Woodfinishing?*

114. What material is commonly used as a flux in brazing or in hard-soldering?

115. How is the direction of rotation of a three-phase electric motor reversed?

116. Name two members of the A.V.A. Committee on "Standards of Attainment in Industrial-Arts Teaching."

117. What do the letters "P. E." mean in educational statistics?

118. With what educational institution was Ira S. Griffith associated immediately prior to his death?

119. Who is Director of the Federal Board for Vocational Education?

120. What is the approximate date when manual training was first introduced into a public school in the United States?

121. What material is permitted to evaporate when oak is being fumed?

122. Who was the author of *Emile?*

123. With what educational institution has Charles A. Prosser been associated for some time?

124. What gauge galvanized iron would you choose for making an ordinary 12-qt. pail?

125. What man in industrial education is famous for his work in graphical analysis?

126. What is the name of the vertical members of a window sash which separate the panes of glass?

127. What do the letters "FAS" mean to the woodworker?

128. At what angle are centers for machine lathes usually ground?

129. Who is editor of the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION MAGAZINE?

130. With the educational work of what state is H. W. Schmidt associated?

131. What kind of steel is ordinarily used for line shafting?

132. When soldering tinplate, what material is commonly used as a flux?

133. At what angle is a lathe tool ground for cutting U.S.S. threads?

134. With what educational institution is Albert F. Siepert associated?

135. What is associated in your mind with the name of Walter K. Schmidt?

136. With the educational system of what city is Earl L. Bedell associated?

137. In which of our industrial-arts subjects has Ray F. Kuns contributed several publications?

138. In foundry work, what is the wood or metal box called which holds the molded sand for receiving the molten metal?

139. What two metals compose brass?

140. What is the essential physical property of an automobile valve spring?

141. What is the name given to the segmented part of some electric motors against which the brushes make electrical contact?

142. What is the unit of work ordinarily used to express the amount of electrical energy consumed?

143. What is the name for a square of the body of a type, often used by the printer as a unit of measure?

144. What kind of wood is usually used to make bowling balls?

145. What gauge standard is commonly used to measure copper wire?

146. With what educational institution is Otto A. Hankhammer associated?

147. With what educational institution is William H. Stone associated?

148. With what educational institution has Robert L. Cooley been associated for some time?

149. Who was co-author with Mossman, of *Industrial Arts for Elementary Schools?*

150. Who is credited with

inventing the first movable type in printing?

151. Who is author of *Exploring the Manual Arts?*

152. Who contributed for his doctor's dissertation *Policies in Industrial Arts Education?*

153. For what industrial-arts subject has Ralph W. Polk written several books?

154. Who is author of *Wood and Lumber* and *Coloring, Finishing, and Painting Wood?*

155. If the crankshaft of an ordinary auto engine turns X revolutions per minute, how fast does the camshaft revolve?

156. With the schools of what city is O. B. Badger associated?

157. In a word each, what are Thorndike's three laws of learning?

158. In what city and state is the Stanley Rule and Level Plant located?

159. Who is Director of Vocational Education and Practical Arts in Kansas City, Missouri?

160. Who represents industrial-arts education on the Executive Committee of the American Vocational Association?

161. What is the name for a piece of type composed of two or more letters or characters?

162. In what city and state is the Frank Wiggins Trade School located?

163. With the educational work of what state is George K. Wells associated?

164. With the school system of what city is Harry E. Wood associated?

165. In the educational system of what city does William E. Roberts work?

166. What was Isaac Babbitt's chief contribution to industry?

167. With what educational institution is George B. Cox associated?

168. With what educational institution is Charles H. Bailey associated?

169. With the school system of what city is Elmer W. Christy associated?

170. Who contributed for his doctor's dissertation *The Training and Experience of 480 Industrial Arts Teachers?*

171. With what educational institution is Edwin A. Lee associated?

172. With an eight-cylinder automobile geared 3.5 to 1, how many power strokes of the engine are there per revolution of the rear wheels?

173. With the sloyd training work in what city was Gustaf Larsson associated?

174. With the educational system of what city is Charles A. Kunou associated?

175. What is associated in your mind with the names of Taylor and Gilbreth?

176. Using oblique projection, what will be the shape of the projection of a circle on a parallel plane?

177. With what educational institution is F. Theodore Struck associated?

178. What comes to your mind when the names of Caslon, Bodoni, Goudy, and Cheltenham are mentioned?

179. With what educational institution is Elroy W. Bollinger associated?

180. Who is sometimes spoken of as "The Father of Vocational Guidance"?

181. What is the man's name who is Specialist in Industrial Education with the U. S. Office of Education?

182. With what educational institution is George E. Myers associated?

183. Who is author of *Industrial-Arts and Prevocational Education in Intermediate and Junior-High Schools?*

184. What size (give No.) of carpet tack would you use to fasten webbing to a walnut seat frame of a footstool?

185. With the educational system of what city is Charles F. Bauder associated?

186. Who is co-author, with Snedden, of *Reconstruction of Industrial Arts Courses?*

187. Of what institution was John D. Runkle president?

188. With the educational work of what state is K. G. Smith associated?

189. A page of type 30 picas wide is approximately how wide in inches?

190. Who is author of *The Manual Arts, Art Training for Life and for Industry, and Problems in Mechanical Drawing?*

191. On a ¼ in. U.S.S. bolt how many threads are there per inch?

192. What is the general term used to designate education of the following kinds: agricultural arts, industrial arts, commercial arts, and household arts?

193. With what educational institution is Thomas Diamond associated?

194. Who is Secretary of the National Education Association?

195. Who wrote *Industrial Arts in Education?*

196. With what educational institution is John M. Brewer associated?

197. With what educational institution is Ralph E. Pickett associated?

198. With the educational system of what city is Frank C. Moore associated?

199. Who is author of *Methods and Teaching Problems in Industrial Education* and also *Foundations of Industrial Education?*

200. With what educational institution is Glen U. Cleeton associated?

Garage built by students of the Nebraska Wesleyan Teachers' Training College, University Place, Nebr. Robert J. Hardin, Instructor

Individualizing the Instruction

Max S. Henig

Essex County Vocational School, Bloomfield, New Jersey

The need of fitting the instruction sheet to the student has ever been apparent. The writer shows a method, somewhat different from that used in the contract plan, which others may find as helpful as he has found it.

THE whole philosophy of the individual instruction sheet, particularly in its use to teach the academic subjects, and only slightly less so in teaching the technical subjects, is that it permits each pupil to realize fully on his capacities. One does not need to enlarge upon the fact, that supplying a group of students with identical lesson sheets is individual instruction only in form. Some will find a given instruction sheet too easy; some, too difficult. Whatever may be the reason for the lack of fit between the pupil and the instruction sheet, the success or failure of the method rests upon overcoming it. This can be done by individualizing each instruction sheet.

One practicable way of individualizing these sheets, that is, adjusting each to meet the requirements of each and every student, is to set up each lesson sheet on three levels, formulated to fit respectively the slow, the average, and the advanced students. Such a scheme involves overcoming various inherent difficulties, among them, determining the subject matter suitable to each level, and on the same basis, assigning problems, projects, and questions. As may well be expected, this adjustment of subject matter and assignment to students of various abilities involves a technique that can be commanded by only the most experienced teachers.

An instruction sheet so devised possesses a high degree of fitness for each student. Each sheet is so formulated and so set up in both the information and the assignment sections, that the more backward pupils actually have an excellent chance of getting by their own efforts those essentials of the lesson that may fittingly be termed the "core." They also, therefore experience the thrill that comes from being successful, and so come to read a fresh meaning into the process of being educated. Another section of the sheet is prepared especially for the student who has the intelligence, the equipment, and the attitudes that enable him to do work of average grade, both as respects quantity and quality. The final section poses those problems that only the most capable and conscientious students would have the time and the inclination to attempt. The three sections, moreover, rather definitely present the material spirally, so that the more capable and industrious students benefit from both more intensive as well as more extensive study.

This plan appears to impose upon the instructor the problem of determining which students shall be required to operate at each level. In reality, the students are maneuvered into effecting this sorting-out process themselves. This is done by the simple device of setting a time limit upon each sheet, this time being sufficient to enable the diligent "slow" student to complete the "core" or "A" section of the assignment. Then, their own habitual attitudes toward schoolwork, in combination with those devices that the skilled teacher commonly uses to keep every student keyed up to doing his best, will lead each student to get as much out of the lesson as his capacities permit. This device of a maximum-time limit has one other advantage, it keeps the group more or less together so that, should occasion arise, topics of general interest can be presented and discussed to the benefit of every member of the group.

The following individualized instruction sheet, presented solely as an example of the form these sheets take, exemplifies one other differentiation between the assignments for the slow and the more capable pupils. For the least capable pupils, definite page assignments are made; for the others, the use of the index and even the selection of reference books are integral parts of the problems set by the assignments.

Subject: IMMIGRATION

The *purposes* of this lesson are:

1. To give you some facts concerning immigration in the past.
2. To acquaint you with the present size of our foreign-born population.
3. To inform you concerning the effects of unrestricted immigration on working and living conditions in this country.
4. To acquaint you with the arguments for and against restricted immigration.
5. To help you understand that people from different countries have all added something to our national welfare.
6. To lead you to assist in "Americanizing" our immigrants.

INFORMATION SECTION "A"

You should study the information given in the pages listed in the following books:

Finney, *General Social Science*, p. 317 ff.
Johnson, *We and Our Work*, pp. 58, 172.
Jenks, *We and Our Government*, p. 77.

Questions and Projects

When, as a result of your study, you feel you have all the information you need, do the work called for in the following questions and projects:

1. Give several reasons why people have migrated to this country.
2. What has been the effect of immigration on wages?
3. On an outline map of Europe, name and show in some color the countries that sent us the greatest number of immigrants before 1880. In some other color, show those countries that sent us the most immigrants after 1880.
4. Upon an outline map of the United States, show by colored crayons, or otherwise, the places of settlement generally favored by immigrants before 1880, and those favored after 1880.
5. What were some of the causes for this change in the place of settlement of immigrants?
6. What classes of foreigners are not permitted to enter this country?

INFORMATION SECTION "B"

Use the indexes of the following books to get the information you need for the work required in this section.

King and Barnard, *Our Community Life*.
Towne, *Social Problems*.

7. In what ways did the immigrants after 1880 differ from those arriving before that date?
8. Why does the modern immigrant refuse to settle in our farming districts?
9. What is the purpose of each of the tests that are given to people who wish to migrate to this country?
10. Tell briefly how Americanization has helped make useful citizens out of our immigrants.

INFORMATION SECTION "C"

You may use any reference books you desire.

11. List and explain several of the chief causes why people have left their native land to settle here.

12. Draw a graph showing the number of immigrants by ten-year periods from 1820 to 1920.
13. Present two arguments against the idea that this country still needs unskilled laborers.
14. What changes have occurred in this country that have made a change in our immigration policy necessary?
15. Make a drawing, original or otherwise, that illustrates some important feature of the immigration problem.
16. Give several reasons why the *new* immigration is not so helpful to national welfare as the *old*.
17. The law now requires that as many as possible of the tests for immigrants be given at foreign ports. What are the advantages of this plan?
18. Tell briefly why Americanization work was necessary.

* * *

Individualized instruction sheets like the above have the added advantage of simplifying somewhat the problem of rating. We consider it good practice to give the comparatively underendowed, the *slow*, student, who manages to cover passably the *core* of the assignment, a rating of *satisfactory*. Therefore only the rare few who willfully loaf ever *fail*. This is as it should be. Those who surpass the minimum level for a satisfactory rating get as much credit as the amount and quality of their work, considered in the light of their ability, call for. To a considerable degree, since the instructor strives to keep each pupil interested and devoted to his task, the amount of ground covered during the time set for the completion of one of these individualized instruction sheets becomes the determining factor in the rating.

Freshmen and Their Leisure

W. E. Belleau

Milwaukee, Wisconsin

A study of how the present crop of beginners in high school spend their time before and after school.

TO BE able the better to advise freshmen concerning the amount of schoolwork they should carry, the choice of electives and courses, the way to make a success of their high-school work, and the selection of an occupation suited to their aptitudes, abilities, and interests, 500 freshmen boys of a technical high school were requested to answer a questionnaire relative to their activities outside of school during the school year. The information obtained in this manner would supplement the class records, intelligence tests, aptitude tests, achievement tests, and teachers' opinions relative to the students' character, ability, personality, and interests already on file.

A copy of the questionnaire follows:

Leisure Time

1. How old are you?
2. On an average, how many hours do you sleep a night?
3. Where were you born?
4. Based on an average week during the school year, how many times do you:

Attend a movie?	Go to church?
Attend a theater?	Go to pool hall?
Go to the Eagles?	Go to playground?
Go to the Elks?	Go to park?
Go to some other club?	Go to library?
Go to the Y.M.C.A.?	Visit friends?
Go to Social Center?	Visit relatives?
Go to a public dance hall?	Other places?

5. In what school activities (sports, clubs, music) do you participate? How many hours a week?
6. What is your hobby?
7. How long does it take you to go to school from home? How do you go?
8. Outside of school, do you take lessons in music? Religion?
9. Based on an average school week, how many hours *outside* of school do you:

Study?	Play around home?
Read newspapers?	Spend on your hobby?
Read magazines?	Practice music?
Read books?	Sit around aimlessly?
Listen to the radio?	Other activities?
Work at home?	

10. Are you working during this school year?
    At what?
    How many hours a week?
    What salary do you receive?

To guard against receiving inaccurate replies, the instructors told the boys the purpose of the questionnaire and requested them to be as accurate as possible, for their answers would not affect their class grades. Each question was explained carefully, and the students had the opportunity to ask questions to assist them to write truthfully.

The average age of the 500 boys was 15 years and 7 months, and the average intelligence quotient was 100.5. The average time spent sleeping was 8 hours and 45 minutes.

The birthplaces of these students were as follows:

Milwaukee	396	Czechoslovakia	1
Other places in Wisconsin	60	Hungary	1
Michigan	9	Mexico	1
Minnesota	6	Missouri	1
Colorado	3	Nebraska	1
Germany	3	Nevada	1
Illinois	3	New York	1
Indiana	2	Ohio	1
Iowa	2	Pennsylvania	1
North Dakota	2	Yugoslavia	1
Texas	2		
California	1	Total	500
Canada	1		

The following information is based on an average week during the school year:

Attended or Visited	*No. Boys*	*Total No. Times*	*Average No. Times Per Boy*
Motion pictures	500	450	.90
Theater	500	83	.17
Eagles	500	55.0	.110
Elks	500	12.5	.025
Other clubs	500	133.0	.270
Y.M.C.A.	500	37.0	.074
Social Center	500	247.5	.490
Dance hall	500	38.0	.076
Church	500	571.0	1.140
Pool hall	500	37.0	.074
Playground	500	1315.0	2.630
Park	500	693.0	1.380
Library	500	433.0	.870
Friends	500	860.0	1.720
Relatives	500	485.0	.970
Other places	500	562.0	1.120

School Activity	*No. Boys*	*Total Hours*	*Average Hours Per Boy*
Sports	85	393	4.6
Clubs	40	54	1.3
Music	42	182	4.3

Method of Going to and from School	*No. Boys*	*Total Minutes*	*Average Minutes Per Boy*
Automobile	39	1314	33.6
Bicycle	72	2712	37.6
Street car	186	2328	50.6
Walk	203	17639	86.8

Lessons Outside of School	No. Boys
Music	43
Religion	33

Below are tabulated the various home activities:

Activity	No. Boys	Total Hours	Average Hours Per Boy a Week
Study at home*	468	1761	3.7
Read newspapers	456	1214	2.6
Read magazines	264	734	2.7
Read books	371	1407	3.8
Listen to radio	400	1668	4.2
Work at home	454	2770	6.1
Play around home	372	2234	6.0
Practice music	71	301	4.2
Sit around	173	489	2.8
Other activities	217	1258	5.8

The time specified for hobbies was not duplicated under playing around home or under any other heading. One may question whether or not all of the activities listed below are hobbies. However, they are taken from the boys' answers on the questionnaires.

Hobby	No. Boys	Average Hours a Week
Baseball	79	5.09
Stamp collecting	27	2.16
Wood carving	19	5.03
Aviation	14	3.53
Swimming	12	3.48
Nature study	11	4.00
Automobile building	10	9.30
Tennis	9	9.20
Riding a bicycle	7	9.54
Drawing	7	4.41
Goldfish	6	5.06
Electricity	6	7.00
Radio	6	3.23
Collecting books	5	2.36
Chemistry	4	3.30
Shipbuilding	2	1.25
Collecting coins	2	2.50
Reading books	2	2.25
Flower raising	2	1.30
Pigeons	2	4.00
Raising fish	2	6.00
Relics	1	3.00
Horses	1	5.00
Knife work	1	2.00
Collecting insects	1	3.00
Singing	1	5.00
Raising birds	1	9.00
Magic	2	2.00
Patternmaking	1	2.00
Inventions	1	3.00
Bird houses	1	2.00
Making toys	1	2.00
Telegraphy	1	5.00
Model building	1	5.00
Fixing motorcycles	1	0.30
Music	1	5.00
Art	1	3.00
Hiking	1	11.00
Collecting pictures	1	2.00
Typing	1	3.00

*Thirty-two boys never studied at home.

Of the 500 boys who answered the questionnaire, only 172 were working during the school year. The occupations, number of boys, average hours worked per week, and salary are tabulated below:

Occupation	No. Boys	Average Hours Per Week	Average Salary Per Hour
Newspaper boy	125	5.2	.29
Store clerk	12	5.8	.43
Delivery boy	5	9.4	.16
Trucker	1	19.0	.37
Factory	1	3.0	.33
Auto mechanic	1	17.0	.12
At residences	6	8.3	.17
Caddy	5	11.0	.27
Usher	2	15.0	.17
Pin setter	1	2.0	.50
Telegraph messenger	1	50.0	.17
Gardener	1	6.0	.10
Janitor	2	23.0	.19
Errands	2	7.5	.08
Delivering milk	1	12.0	.71
Chopping wood	1	1.0	.25
Upholstering	1	10.0	.25
At ball park	1	16.0	.40
Drawing pictures	1	4.0	1.00
Shining shoes	1	10.0	.40
Repairing boats	1	8.0	.30

It does not appear that any general indictment against the youth of today is applicable to the boys who answered this questionnaire, or, in the first place, they cannot be keeping very late hours, because on an average they sleep nearly nine hours a night. Secondly, they attend church more frequently than they do motion-picture shows. Only 23 boys visit dance halls, and the majority of these boys do not participate. On the other hand, the average boy goes to parks and playgrounds four times a week.

It is unfortunate that only 25 per cent of the boys participate in school sports, music, and clubs. The chief reason seems to be that nearly 80 per cent of the boys have to spend on an average from 50 minutes to an hour and a half going to and from school. Nearly 94 per cent study about 4 hours a week at home. However, too much time is wasted reading newspapers, cheap magazines and books. Eighty per cent listen to the radio more than 4 hours a week, 74 per cent play around home 6 hours a week, and 90 per cent work at home 6 hours a week. In addition to working at home, 34 per cent work out, approximately 6 hours a week, for an average salary of nearly 30 cents an hour.

The Vocational-School Library

John T. Shuman

High School, Williamsport, Pennsylvania

A school built up on service will always bear a good reputation in its community. The suggestion made in this article presents a form of service which would be much appreciated, were it more commonly rendered by the school.

ALTHOUGH school and books are synonymous in the minds of our business and industrial friends, it is very seldom that these same people turn to the school for either leadership or guidance in the selection of books for reading or study. Business and industrial men find it difficult to secure the wide variety of up-to-date technical and semitechnical books they want to read. Many companies are operating on a decidedly low book and magazine service for their executives; and, because of the cost involved, these same men feel that they cannot personally purchase even a small proportion of the books in which they are interested. On the other hand, the popular demand for fiction, biography, and the books of

a more general nature, makes it impracticable for our public libraries to purchase many of the books valuable to our executives and skilled workers.

Because of these facts, we have found it very much worth while to make the books in which our trade and industrial friends are interested, available to them in our vocational-school library. Actually the idea originated with a local business executive and not within our schools.

Small pamphlets containing lists of all publications available are printed in the vocational-school printshop and distributed to interested executives, foremen, or workmen. Publicity is also given the movement through evening-school classes, especially those in foremanship training. The co-ordinator also has ample opportunity to give out information about these books.

Books are lent to any responsible executive in a local plant and to any employee on the signature of a responsible executive, or of the employment manager. The books are lent for a period of two weeks or a month. The individual can secure the book from the school direct, or, if convenient, the co-ordinator finds an excellent point of contact frequently by just "dropping around" with such a book when he gets in the vicinity of the plant. In fact, it is very seldom that the co-ordinator in his frequent trips about town does not find it convenient and profitable to take one of the books wanted to an executive or foreman.

It is true that the school, like other organizations, may be operating on a minimum budget and that a comprehensive up-to-the-minute selection of pertinent books may not be available. However, if the school organization has "been on its toes" in the past, the chances are that there will be on hand an adequate number of books with which to initiate the plan. On the other hand, once in operation, it is surprising how many of the better and much-read books are either donated or are deposited in the library, by friendly industrial organizations, who have become interested in the establishment of a centralized technical and industrial library.

As they become accustomed to the idea, foremen and executives suggest books and publications of interest to them. These suggestions assist materially in the selection of new books, and the purchase of a suggested publication frequently goes a long way to the creation of another friend for the school.

A library of this type must, of necessity, be a matter of slow and unhurried growth. But certainly, for too long, many of us have neglected here an excellent source of contact and of friendship with trade and industrial organizations. Surely it is logical, and as a matter of experience it is practicable, that the vocational-school library contain and make available to trade and industry insofar as it is possible the best collection of trade, technical, and semitechnical books in the local community.

Foreign Wood Carving—IV

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Director Industrial Arts,
Miami, Florida

This is the concluding number in the series of studies on wood carving as taught in the schools of foreign countries.

WOOD carving is extensively taught in some of the schools in practically all European countries. Sometimes it is given as an art subject, again it is taught to very young children as a part of industrial-arts work, or it is found in vocational or trade schools as a part of the carpentry, joinery, or cabinet-making trades. Both France and Spain make much use of carving as hand training in the early grades. India produces much beautiful carving in her schools organized to function in the major building trades.

A great deal of the carving done in the northern European countries is wood sculpture, and not carving, to add beauty and decorative effect to some structural element. This, for

Fig. 34, A, B, and C. Carving work produced in Staatliche Fachschule für Holzschnitzlerei, Oberammergau, Germany

Fig. 35, A and B. Done in the Schnitzlerschule, Brienz, Switzerland

Fig. 36. Typical of a large number of similar photographs received from the schools of northern Europe. Fig. 37. A very unusual treatment of the Crucifixion done in rough surface carving

instance, is true of the schools in Poland where wood carving is taught in the following allied arts schools: Academy of Arts, Warszawa; Academy of Arts, Crakow; County School of Decorative Arts, Warsaw; State Technical School, section of decorative arts, Lwow; State School of Decorative Arts and Artistic Industry, Poznan; State School of Decorative Arts, Zakopane.

Probably the best wood-carving work done in the schools of England is that done at the South Kensington School of Wood-carving in London. Here a number of selected students are trained for the carving trade. Apart from this, the work of carving is mainly done in the art schools. In the Bedford Modern School, some excellent work has been done along traditional lines. In this school, the students of carving have, from time to time through the years, carved a paneling around the walls of the lecture theater. These panels are carved voluntarily by the students, as and when they feel like it. There seem to be no restrictions as to subject, design, or method. The effect is very interesting. One can trace a gradual improvement in both treatment and design as the work has progressed.

Religious-Subject Carving

Oberammergau perhaps produces a greater quantity of carving based on religious motifs than any other community of similar size in Europe. The work done here, however, is for the most part confined to small-object carving, such as can be produced cheaply and is convenient for tourists to carry away. Nearly every art school where carving is taught turns to some extent to religious-subject carving.

The carvings shown at A, B, and C, in Figure 34, are from the Staatliche Fachschule für Holzschnitzlerei, Oberammergau. The groups shown at A depict the entry of Christ into Jerusalem. At B is the birth scene, and at C is a collection of 25 or more small images illustrating biblical characters and events. Some very excellent work is done on these small figures.

At A and B in Figure 35 are shown two excellently conceived and worked out figures. These were made in the Schnitzlerschule, Brienz, Switzerland.

The group shown in Figure 36 was made in the Fachschule Partenkirchen, Germany. This group is typical of many similar pictures from the schools of Northern Europe.

We will conclude this brief study of religious-subject carving with Figure 37, a very unusual treatment of the crucifixion done in very rough surface carving and making on the whole an unusual piece of student carving in this special field.

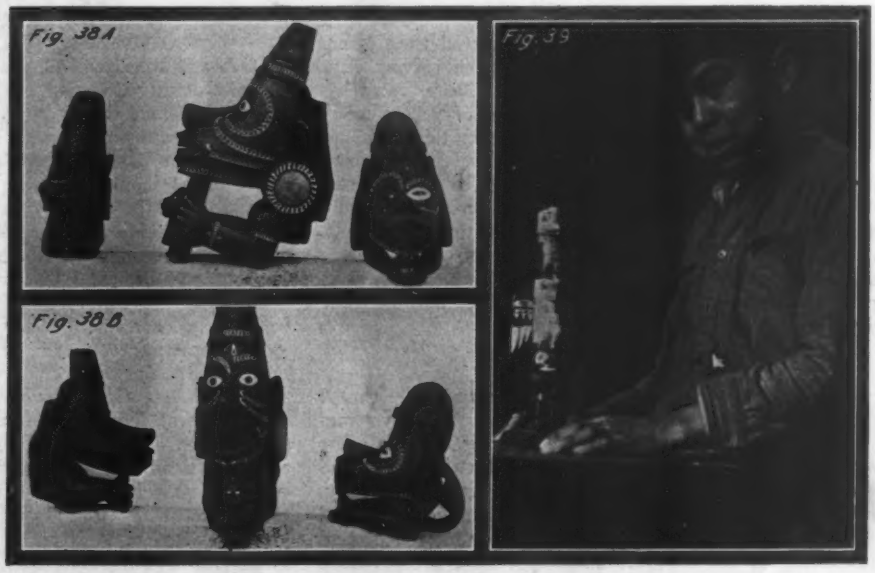

Fig. 38, A and B. Fetishistic carvings made by the natives of Fiji Islands. Fig. 39. Totem carving by U. S. Indian School in Alaska

Fetishistic Carving

Fetishistic carvings are mostly of a religious nature, being used often in the ceremonial dances, sometimes as objects of worship, and at other times to placate the gods. Religious observances in fetishistic countries are used to escape punishment now and hereafter, and not as means for bettering one's ways of living. Little attention has been paid to this form of carving, long regarded as purely barbarian. In recent years, however, enthusiastic collectors have recognized unusual individual characteristics in fetishistic arts.

The fetishes shown at A and B, Figure 38, were made by the natives of the Fiji Islands, and were received from A. T. Phillips, a teacher in the schools of Suva. The smallness of the lower limbs and the arms is characteristic of all fetishistic carving. We cannot, of course, say what these figures are intended to represent, but they are rather unusual examples of this type of carving, and are cleverly decorated.

Fetishistic carving is also found in numerous masks, carved to fit the head and face, and are used by the medicine men and in the tribal dances. Since we are treating masks under a separate heading, we are leaving them out here.

In Figure 39, Ernest McKay, 15-year-old full-blooded Thlinget, is shown with his personally carved totem pole. This is some of the work done in the totem-carving class at the Indian School at Ketchikan, Alaska. There are twelve Indian boys in this class. This pole, made of yellow cedar, is a miniature. Some of the poles made in this class are mammoth affairs, being made of tree trunks eight or more feet tall. This type of work cannot properly be classed under fetishistic carving, since it is not religious in nature. It should be looked upon rather as symbolical, representing tribes, clans, families, or individuals. Some of these totem poles show a sort of genealogical history, or they may be looked upon as personal name plates which have significance only to those who understand the symbolism.

Fig. 40. Examples of carved masks done in the schools of Germany

Masks Carved in Wood

Some of the finest and most interesting masks are carved in wood, and so, to this extent, mask making properly comes under the head of wood carving. The carving of masks offers a wide scope and there are a limitless variety of types and expressions. The mask, if intended for stage use or pageantry, must be hollowed out inside to fit the head with holes provided for the eyes, for breathing, etc. Some of the most weird and interesting of all masks are made by various savage tribes, and by the Indians of South America and Mexico. These masks are used in savage ritual and worship. They are often fearsome things with horns and all manner of symbolic decorations. The painting of these masks makes them still more weird and awe-inspiring. Some of the finest of modern dramatic masks are made by W. T. Benda, artist, whose work represents perhaps the very best in mask making.

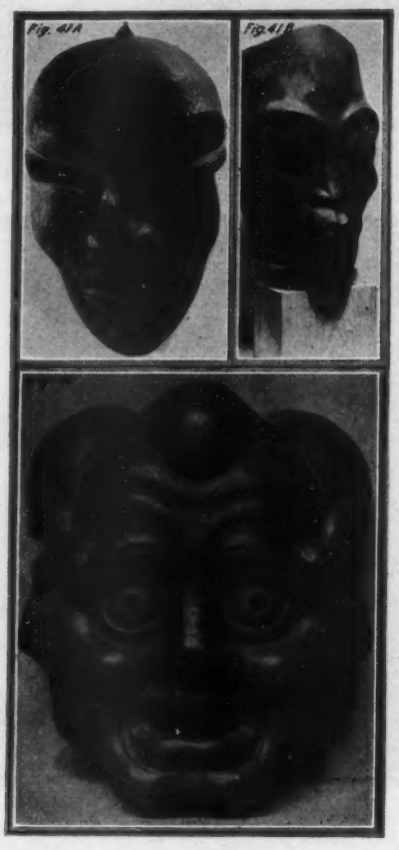

Fig. 41, A and B. Masks carved by the students in the School of Fine Arts, The Hague

At A and B, Figure 40, are shown some very excellent examples of carved masks. These were made in the German schools. Different characters as represented in the play, or pageant, wear these masks to represent different emotions, or mythical or historical personages, etc.

The masks shown at A and B in Figure 41 were carved by students of the Academy of Arts in the Hague.

The one shown in Figure 42 is a mask made in the school at Arnhem, Holland. This is a typical Grecian-type mask. It will be noted that masks are always deeply and prominently carved. This is necessary to bring out the features under artificial lighting. Fine mask making is a special department of work in itself and is a trade closely related to the fine arts.

In concluding this series of articles on wood carving in the schools of foreign countries, I wish especially to thank the teachers, directors of education, and the foreign consuls, and others, who have assisted in making this interesting collection possible. Let us not forget also our debt of gratitude to the many students whose handwork is represented in this collection. It is to be regretted that owing to the limitations of space, cost, etc., it has been possible to show but a few of a very large number of interesting pictures.

Teaching Auto Mechanics

John Claude
Milwaukee, Wisconsin

Recent trends as noted by the writer who has the opportunity for making first-hand observations in schools throughout the country.

IT IS interesting to note, when calling on schools, how the teaching of auto mechanics has changed in the past years. When this interesting subject was introduced into the junior high school, for instance, the auto-mechanics instructors who were brought in, immediately started to equip the school on a trade-school level. Difficulties, however, developed immediately, because it was found that many of the boys were not strong enough to lift and handle the heavier parts. The equipping of the auto shop in the junior high school, therefore, has taken a definite trend away from automobile repairing and servicing. There are now approximately 235 departments of auto mechanics in the junior high schools of this country utilizing about 245 instructors. In most of these schools, the subject is taught through lecture and reading courses. A cut-away chassis seems to prove ample because the objective of the course in the junior high school is primarily to teach the youngster what makes the wheels go around with as much simple technical matter and vocational-guidance material as can be added.

In some junior high schools, auto mechanics has been made part of the work offered in the general metal shop.

With the wealth of reading and descriptive material now available in the form of textbooks, as well as wall charts, motion picture films, catalogs and other material furnished free by the manufacturers of motor cars, it is quite a simple matter to make the story of the automobile appealing to the average boy.

In the High School

The high school, too, seems to have difficulty in deciding just what is to be done in its auto-mechanics courses. In some high schools the subject is treated from the industrial-arts viewpoint. In others it is looked upon from the technical and trade angle. In still others, a happy medium seems to have been struck and the subject is taught from both an industrial-arts and a vocational-education standpoint. In the past few years the subject has been taken out of a number of high schools in small towns. The reason for this probably may be assigned to the fact that the instructor thought it was his business to run a repair and servicing garage in the school.

In one town with a population of over 50,000 where the subject had been discontinued, it has again been added to the curriculum. The auto-mechanics department in this high school was taken out of the basement and placed in a room on the second floor which had formerly been devoted to the teaching of science. An investment of $40 procured enough used-car material to furnish the room with almost every variety of modern automobile parts. There are various types of engines, transmissions, front and rear axles, and so forth. All of these parts have been cleaned, repaired, and set up on suitable stands and foundations, making a very workable arrangement from the teaching standpoint.

The students in this school may elect auto mechanics for two years. The first year is spent in the room just described studying the theory of the automobile, and taking down and assembling the parts. On the walls of this room are displayed many instructional charts which were obtained from motor-car manufacturers. The second year of auto mechanics is taught in a basement shop where the student works on live units and where the functioning of the motor car as a whole is studied.

In another town of a 100,000 population, the instructors have gone a step further. They not only have various types of engines, pumps, ignition units, transmissions, etc., but they have arranged them so that they can be activated by means of 1/4, 1/3 and 1/2 h.p. electrical motors. This particular method works out very well.

In a city of 750,000 population, certain boys who have difficulty with their academic subjects are allowed to spend as much as four periods a day in the auto shop. A special course has been arranged for them so that their English, science, and other academic subjects are all correlated with the subject of auto mechanics. It is interesting, for instance, in this school to note with what absorption and interest these boys who previously had evinced no interest in their science work now determine the density, viscosity, flash point, burning point, etc., of lubricating oils.

In this school, each of the automobile engines in the shop is inclosed in a stout wire cage. When the study of the engines is taken up, a crew of four boys with a foreman are assigned to each of the motors. When they are ready to start work, they get a key from the instructor with which to unlock the cage. The cage can then be removed and a check made to be sure that all necessary parts such as spark plugs, the carburetor, electric accessories, etc., are intact. If any of these parts are missing a report is made at once to the instructor. In this way the responsibility for any losses can be fixed at once.

The auto-mechanics departments that seem to have the greatest difficulties are usually those having instructors who believe that the only worth-while thing to teach is automobile repairing. Probably there is no other subject in which there is such diversity of opinion as to the proper course content. This may be attributed to the lack of effort on the part of many teachers to determine just what should be included in an auto-mechanics course having the industrial-arts objective and what to put into the course when trade training is the end in view. In most cases, where difficulties exist, no course of study has ever been prepared and many teachers of auto mechanics seem to think that the use of a textbook is an expression of weakness. Some of the tragedies that have been observed are where the high-school auto shop exists purely as a service garage for faculty cars. In other cases, the teaching equipment in the shop dates back to 1925 and earlier. In some of these shops the entire auto-mechanics course consists of tearing down and repairing these old relics year after year. Then, too, many of the shops are dark and filthy and in some cases the entire teaching equipment consists of junk which could not be sold for more than five dollars. Equipment of this kind can hardly be said to stimulate high-school students to study, nor can it give them a good opinion of the subject.

In the Technical High and Vocational Schools

It is in these institutions that the greatest progress in the teaching of automotives has been made. A number of years ago, a school shop in which trade auto mechanics was taught, was purely a repair shop. Now, however, demonstration, lecture, and academic rooms are found adjoining the shop and there is a growing appreciation that the subject of auto mechanics is exceedingly rich in source material for teaching science, mathematics, and other academic subjects.

There are now entire school buildings devoted exclusively to the training of young men for entrance into the automobile

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

J. J. Metz, Editor

How The Machine Has Helped Unemployment

Again and again, pessimists are heard to remark in most doleful tones that the machine is on its way to supplant man. These remarks are usually taken seriously, too, and by men whose education should prompt them to take such general remarks cautiously. Even many shop teachers are affected by this talk, yet they ought to know some of the fallacies contained in them.

A study made by the National Industrial Conference Board, New York, for the National Machine Tool Builders' Association of Cleveland, showed that the population gainfully employed in the United States in 1870 was 32.4 per cent of the total. This had risen to 39.8 per cent in 1930. During the same time, the population rose from 38,500,000 to 122,700,000. This means that while the number of gainfully employed in 1870 was 32.4 per cent of 38,500,000, or a total of 12,505,923 in 1930, this number had increased to 39.8 per cent of 122,700,000, a total of over 48,000,000. The population had increased 3.19 times during these sixty years, yet the number of gainfully employed had increased 3.91 times.

It must be remembered too, that in 1870 more than half of the workers were engaged in agricultural pursuits, while in 1930 this was true of only a little more than one fifth of the workers.

It was during this very period, 1870 to 1930, that the machine made its greatest progress, yet the numbers of workers increased tremendously despite the fact that the number of agricultural workers materially decreased. All of this is evidence that the machine need not be feared as a Frankenstein monster, especially if industry will take a more humane view of the workers who not only produce the machine, but also must supervise the work which the machine does.

Dr. R. A. Millikan, of the California Institute of Technology, in a statement made before the American Institute of Physics at New York, says, "Taking the long-range view, there is no such thing as technological unemployment. I say this by authority of the official census of the United States, which in 1880 listed the percentage of people gainfully employed as 34, but in 1930, depression year, as almost exactly 40. This is the period during which science was applied most rapidly to industry, and in it the percentage of our population living by means of jobs has continuously increased."

The New York *Times* credits him with the prediction that science, in the near future, would bring about the birth of new and enormous industries. These remarks were backed by statistics showing that the automobile industry, exclusive of those who furnished to the industry such materials as steel, rubber, glass, and textiles, employed 2,409,394 persons. This, compared to the 976,004 workers who operated and cared for horse-drawn vehicles in 1900, shows conclusively that what one industry lost was more than regained by the increases brought about by replacing the horse with a machine.

In the same way, it may be shown that the airplane has made possible the employment of 50,000; the electrical industry, 1,000,000; radio and broadcasting, 94,000; motion pictures, 389,000; and the telephone, 357,000.

Confronted with all this evidence, the teachers of industrial arts and vocational education may take heart that their work in the schools is preparing men and women who will live, and live well, in a civilization mechanized beyond all present expectations, and that the effort now expended in giving the students the groundwork of the sciences underlying the many inventions now used will be a preparation for the use of the new inventions which will presently make man's work still more agreeable, and, let us hope, his accomplishments still more manifold and far-reaching.

Conventions

The season for the monthly and annual meetings of teachers' organizations is approaching. To many, these meetings are anything but welcome. Not relishing the idea of spending money, or time, or both on them, many instructors are very critical of what teachers' organizations are giving their members in return for the money paid as dues, or for transportation and other costs incurred in attending these meetings.

In some cases, these adverse criticisms are really justified, but when this is so, it is the fault of the membership at large. Everyone belonging to a club, lodge, or society of any kind must hold himself responsible for the conduct of its business. If the officers are not capable of arranging something that is worth while for every meeting, the members must attend to improving this detail. This means that the members must recognize their own responsibility. The objective of most of these teacher's associations is primarily the professional improvement of its members. To this end every member must work. Adverse criticism, of course, will point out a condition, but it takes more than that to bring about improvement. One of the easiest things in life is to criticize. To help build up, however, means that one must make personal sacrifice and efforts. The fact that most people are not in favor of personal exertion accounts for the preponderance of critics over workers.

Shop teachers who wish to advance in their profession must of necessity join these teachers' associations. They must get out of the company of those who only criticize. They must do everything in their power to make their organizations function. In so doing, they will gain from the experiences of others much that can be applied in their own shop. They will likewise have

an opportunity to help others with the discussion of the methods and devices which they have found helpful.

All of this is possible only when one has concluded that one must give as well as receive. There can be no passivity about the process. If a teachers' organization is dead, it is safe to conclude that the individual members also are dead. To revive such an organization may require heroic measures, but such measures must be applied if the organization is to give that for which it was originally started.

Fire Prevention Week

While the losses due to the ravages of fire are especially called to the attention of the country during this week, and while the schools are making a concerted effort to impress on their students a wholesome fear of the devastating effect which this elemental force has when it is not properly controlled, it may be well for the shop teacher to study conditions in his own shop to see whether it does not harbor fire hazards that ought to be removed.

A fire in a school shop may occur during the day as well as at night. A night fire would be bad enough, since the entire building would be jeopardized. A school-shop fire during the day time, however, would be very much worse, since then the danger of panic among the children, adds possible loss of life to destruction of property. Naturally, the woodworking shop needs the closest scrutiny. Not only is the well-dried lumber highly inflammable, but the shavings and the cut-offs are admirably suited for starting a fire, which, once under way will be difficult to extinguish. Added to the fire hazards in the woodshop itself are those of the finishing room, or more commonly, of the finishing cabinet. Built of wood, as many of them are, it contains inflammable oils, stains, varnish removers, alcohol, shellac, turpentine, waxes, and straining, wiping, and polishing cloths, all fast-burning, if not explosive materials.

It would be well if all of these finishing materials were stored in steel cabinets with air-tight doors so that there would be little danger of fire from spontaneous combustion. Since, however, so much of this finishing material is still stored on wood shelves and in wood cabinets, the watchfulness of the instructor must be increased.

There must be stringent rules covering the immediate disposal of oil- or stain-soaked rubbing and wiping cloths, paint-soaked paper, and the like. Special care must also be given to the hanging away of overalls and aprons that have been used by those engaged on finishing operations. There should be no open containers standing around with remnants of any of the volatile materials used for finishing, nor should any of these materials be kept in unmarked, or open containers.

The woodworking shops are not the only ones that need scrutiny, however. Even the metal-working shops, the auto-mechanics shops, the printshops, require definite rules as to the disposal of oil-soaked wiping cloths, the storage of oils, benzine and gasoline cans, acids, and the like. Each shop presents its own particular problem with regard to the care which must be exercised to prevent fires. It is well to study each shop to see what fire hazards may be present and then arrange to remove them or at least adopt methods of safeguarding against fire as much as possible.

Another point to remember is that the shop should be safe for the fire fighters, too. Fires may start from causes other than those immediately present in a shop. It is then necessary to fight that fire frequently at short range. Under such conditions, it has frequently happened that firemen were injured because they stumbled over lumber, pipes, or other stock piled on stairs or in runways that should normally be open. These hazards should also be checked. Of course, it cannot be overlooked that where shops are crowded into almost inaccessible places in old school buildings, shop teachers are frequently severely handicapped in making provisions which will fully safeguard their classroom against the danger of fire. It is necessary, however, to study each case and at least take all possible precautions.

Fire is man's friend, but it also is a formidable enemy, and only constant vigilance can insure him against its devastating effects.

The Lesson Columbus Taught

Recently someone, in connection with a joke, said that Columbus was a man who, when he started on his voyage of discovery, knew not where he was going; when he arrived in America, he knew not where he was; and when he returned to Spain to make his report could not definitely say where he had been. The speaker continued, saying, "We may concede that all of this may be true, but it nevertheless remains a fact that Columbus, by his discovery of America, accomplished something so stupendous that man's mind can hardly fathom the extent of what the world owes this indefatigable, dauntless discoverer."

Like Columbus, the teacher frequently must embark on a venture, the final outcome of which may not be quite clear and distinct — yet he must be on his way. Like Columbus, this teacher must advance with courage and hopefulness, ready at any moment to change his course as conditions may demand. Like Columbus, too, this teacher must accomplish what he can, ever intent on bettering the success gained from each new venture. Finally, like Columbus, this teacher may learn to achieve for others without expecting much in return, and to be satisfied in having expended his best efforts without having gained a definite, tangible goal.

The life of Columbus furnishes much which teachers of industrial arts and vocational education might well study and follow, and the month of October is especially appropriate for a review of his life and accomplishments.

industry. Where formerly the trade and vocational auto shops were more or less the dumping ground of boys who apparently could not adjust themselves in other subjects, these auto shops are now attended by an increasing number of high-school graduates. The development of prerequisite courses for entrance into the trade-school auto shop also is worthy of note. In some cities, students are required to take a six-month preparatory course in general mechanics, and in the proper manipulation of hand tools. One preparatory course extends over 18 months before the student is permitted to enter the trade-school auto shops. Whether this procedure is sound or not does not come into consideration. The important fact is that there is a decided demand for high-grade candidates for the industry, who have received a training second to none. It is obvious that some knowledge of machine-shop work, electricity, sheet-metal work, and metallurgy is good preparation for the young man who intends to be a mechanician worthy of taking care of and servicing the racing car of a man like Kelley Petillo.

The real auto-mechanics teacher, even though clothed in a greasy smock and buried in the darkest and most dismal corner of the school building, must not lose sight of the importance of the subject which he is teaching. If he is the right kind of man he will cleverly clothe the dirt and grease and the miscellany salvaged from the junk heap with the romance surrounding the astoundingly rapid developments that have marked the meteoric rise of the automobile industry. He will instill his own enthusiasm into his students and arouse in them the ambition to follow in the footsteps of the men who have made the 1935 automobile possible.

The Art of Metal Working—I

C. Weiler

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This is the first of a series of articles which contains the essential parts of the 1935 lecture demonstration of the Wrot Iron Designers. In it are discussed the design and techniques of metal working that may be used in the schoolroom.

(See Supplement No. 320)

WROUGHT-IRON work is receiving more and more attention as an industrial-arts activity. This may be due to the fact that teachers are forever looking for new and interesting subjects or it may appear especially suitable for schoolwork, because wrought iron is a versatile material especially applicable for use in vocational and avocational training.

Wrought iron lends itself exceedingly well to the making of objects varying in design from those that are so simple that they can be made readily by the pupils in the lower grades, or so elaborate that they test the skill of the most advanced student. Lastly, the material is extremely low in cost, a factor that should carry considerable weight in this day of low budgets. It might also be mentioned that for the general type of work adopted in schools, the equipment needed is simple and inexpensive.

It is to be deplored that poor design characterizes so much of the work made of wrought iron in the school. Then, too, the techniques used frequently are not conducive to the achievement of the best results. Furthermore, the finishes applied very often are not in good taste, nor are they in the spirit of the material used, thus even spoiling the appearance of otherwise pleasing and well-designed articles. The reasons for this are not difficult to find. In order to design efficiently and artistically, one requires first a general but thorough training in art, and second a specific training in design in relation to the medium to be worked. Then, too, years of practical training in the shop are an absolute requirement if one is to know thoroughly the material that is to be used. That such preparation is beyond the scope of the teacher-training school is evident. This article will therefore endeavor to assist the teacher of the crafts in improving his understanding of the fine arts in both wrought iron and beaten metal work. A careful and extensive study of the work in schools shows an extremely pleasing fact, and that is that the workmanship in itself is clean and displays a care and a love for the work, thereby showing a sincere endeavor on the part of teacher and student to do the work right.

This is more than half the battle and will assist those who study this series of articles in overcoming the deficiencies that have been previously mentioned.

The term "wrought iron" as applied to this type of work is in reality a misnomer, as genuine wrought iron finds but very little application in it. The metal used today for artwork is practically all mild steel. The essential difference between steel and wrought iron is one of manufacturing processes and while both are soft and pliable, wrought iron is the more workable of the two. Iron, furthermore, is less apt to have the carbon burnt out in the fire during severe forging operations. Another outstanding quality of wrought iron, particularly for exterior work, is its high resistance to corrosion. However, for the work done in the schools, mild steel is entirely satisfactory.

In setting out to make an object of wrought iron, it is most essential that the work be conceived as a whole and that the design be placed on paper. This means that the article to be made has to be judiciously designed, after which the design should be carefully followed. It is not the intention of the writer to go into the general discussion of design and periods, nor is it essential that the small items made in the school shop be carried out in strictly period design. It is important, however, that the designs for wrought-iron work be created in the spirit of the material that is used. This means that its possibilities as well as its limitations must be considered. It is incongruous, for instance, to take a motif from, or the entire design of a silver candlestick and execute that in iron — or vice versa. Silver is a precious metal and therefore, from the economical standpoint, heavy bars cannot be taken as the basis of a design in which it is to be used. Iron, however, embodies strength and toughness, and being inexpensive, is an ideal medium to be used just that way. Again, copper or brass or any of the softer metals may be chased, raised, or lowered. Sheet iron, however, does not lend itself readily to this form of manipulation. A piece of *repoussé* work in iron may show the manual skill of the worker, but it can hardly be classed as a piece of artwork.

Since most schools are not equipped to do hot forging, the following elements of design were especially chosen because of their application to the work commonly known as cold bent iron work.

Chart I

Chart I shows the most important and widely used form — the scroll. Although most forms used for ornamentation are taken from nature, practically all of them are governed by definite geometric principles. Thus the single scroll shown at *a* in Chart I is a parabolic curve composed of a series of circular sectors struck from different centers. In order to test whether a scroll drawn freehand is good or bad, observe

whether the space, narrow at the inner end, gradually widens as the curve proceeds. Also, the curve composing the scroll should be smooth and the eye should be able to follow, from its beginning to its end, with an even speed without any sudden spurts or stops. The two combinations used most frequently are the double scroll shown at *b* and the S scroll shown at *c*. The scrolls at the two ends may be both of the same size or one may be smaller than the other, depending upon the requirements of the general design. There must be harmony between the two ends, however, as both of them should be designed in the same spirit. In the S scroll, the connecting line should come in a graceful correlated sweep rather than in a straight line. At *d*, *e*, *f*, *g* and *h* are shown a series of combinations with sharp breaks applicable to various types of designs. At *i*, *k*, *l*, *m*, and *n* are shown a number of inner terminations of the scroll. The one at *i* is flared and peened; the one at *k* is rolled solid (this has to be done in the fire); the one at *l* is embellished with a rosette; l_1 shows how the inside is rolled to a loop to take the rivet of the rosette. The scroll shown at *m* is flared and peened, split with the hack saw and then spread. At *n* is shown the termination of a scroll made of round iron, in which the iron is spread flat, cut or filed to the leaf shape, and then slightly hammered.

There are various methods used in the school shops for making these scrolls. There is, for instance, the piece of pipe provided with a slot. Another type of scrolling device consists of pins mounted in a block or set on variable centers. Then there is the heavy piece of round iron bent to U shape which is fastened in the vise. Besides those enumerated, there are many others. One method, not so frequently used, is to hammer the scroll over the horn of the anvil. This, while good, has the disadvantage that it requires skill which can be acquired only by continued practice.

A better way for making a scroll is to shape the first 1½ to 2½ in. over the vise jaws or over the horn of an anvil. The rest of the scroll is then made by means of the bending fork and gauge, especially developed for this type of work. A more complete description of these bending processes may be found in the No. 100 series of job sheets published by the Wrot Iron Designers.

Accidents and the Printer

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This article contains information on accident hazards and their avoidance as outlined in the author's previous article which appeared in the October issue of this Magazine.

WHEN compared with other industries, printing shows a good accident record. The accident severity rate of the printing industries for one year was .29 days lost per 1,000 hours worked. This was the lowest rate of 28 industries. The accident-frequency rate for the same period was 9.67 injuries for each million hours worked.[1]

Sources of Accidents

According to the National Safety Council, most of the accidents in job and newspaper establishments are due to six causes: from handling stock, from floors, from hand tools, from presses, from clothing, and from handling equipment.[2] While accidents from these causes are relatively rare and seldom of serious importance, they are, nevertheless, a potential danger, and require much diligence in safeguarding dangerous operations and machinery. Information requested in a governmental survey of major accidents in the printing trades over a period of five years gave a total of 139 cases, or one for each 585 employees. The ratios from accidental hazards are very low at every age period up to 64. The occupational factor is nil, although the number of machine injuries in the age period from 15 to 24 is high.[3] In this respect, "It has long been recognized that the natural curiosity, lack of prudence, and imperfect muscular co-ordination, inherent in youth, made it dangerous to employ boys and girls in proximity to complicated machines."[4]

Over half of the accidents in the aforementioned survey resulted in the loss of fingers, hands, or arms, and occurred for the most part in pressrooms.[5] The workers, therefore, should be instructed in the common dangers in operation of presses, and also as to the folly of ignoring precautions that insure them against accidents that are easy to prevent. Co-operation between the employer and employee is very necessary to produce good results.[6]

The Use of Guards

The State of Massachusetts took the lead in 1877 with the first American law requiring factory safeguards.[7] Now practically every state in the Union has passed laws requiring the placing of guards on hazardous machines. In this way, the employer has been forced to protect the workers from accidents by guarding exposed belts and pulleys, and by installing platen guards on hand-fed presses. The most serious and permanent injuries occurring in the printing trade are those involved in the operation of rotary, cylinder, and platen presses. Safety treads, toe boards, and handrails should be provided for the upper sections of all large machines. Pressmen often get burned on gas-fired driers when pulling sheets from the press when their hands get caught between the gas flame and the delivery box. A hand hole cut in the side of the box will remove this danger.[8] The habit of removing bits of foreign matter from the forms on a press when the machine is in operation is very dangerous. All presses should be shut down before oiling, cleaning, or adjusting. The operator of the platen press must be impressed by the fact that if he reaches through the press for a falling sheet, he may lose his hand, or possibly his entire arm. Platens should be made-ready so that the operator feeds the sheets over the rising guard, and not from the side of the machine.

Paper-Cutting Hazards

Automatic paper cutters are now fairly well guarded, most of them necessitating the use of both hands in bringing down the blade. A hand on a lever is not one that comes in contact with the knife. Two workmen should never operate the same machine at the same time. This is done in school shops, at times, but it should not be tolerated.

There is little danger from accidents on monotype and linotype machines, as the machines are well guarded against squirts and possible contact with gears and belts.

Clothes Hazards

Men who wear coveralls or overalls in the pressrooms should be cautioned against rolling their sleeves and trousers on the outside. This is a dangerous practice, as the clothing

[1] *Safety and Health in Job and Newspaper Printing Establishments*, p. 1.
[2] *Ibid.*, p. 37.
[3] *Causes of Death by Occupation*, p. 37.
[4] *United States Monthly Labor Review*, December, 1932, p. 1315.
[5] *Health Survey of the Printing Trades*, p. 13.
[6] *Ibid.*, p. 14.
[7] *United States Monthly Labor Review*, November, 1933, p. 1103.
[8] *Safety and Health in Job and Newspaper Printing Establishments*, p. 4.

thus rolled might come in contact with moving parts of the machines. Trousers rolled on the outside also present a tripping hazard. Both sleeves and trousers, if they must be shortened, should be rolled on the inside for safety. Shoes, likewise, if in a ragged condition, create a tripping hazard. Good, although cheap, shoes can be worn with safety.

Handling of Stock

Flat stock, packed in boxes, can be prevented from falling and injuring workmen by nailing a board along from box to box. The stock trucker should receive help in steadying the crates as he tilts them onto his truck. The removal of protruding nails from boxes will prevent possible scratches, which are often a source of infection.[9]

Floor Hazards

Safety habits in regard to floors should be acquired. Sheet metal should be placed under presses and other machines to catch surplus oil and keep it from running over the floor and making it slippery. The floor should be kept clean. Often wrenches, chucks, and the like, are hidden under spoiled sheets scattered over the floor, thus presenting a serious tripping hazard. Aisles should be kept clear, and adjacent furniture must not have sharp or protruding edges.

Press Hazards

To be safe from cuts on the hands, two men should place and remove rollers from press carriages on cylinder machines. Men have been known to be severely cut on the hands by the practice of carrying spot-up knives in their pockets. Shields for open knives should be provided.

Building Conditions

Accidents are often due to the general condition of the building in which the printshop is housed. The individual drive has eliminated, to a great extent, the hangers, shafting, and overhead belts, which formerly obstructed and retarded the diffusing of light, and accumulated or scattered oil and dirt.[10] Windows must be kept clean, and sufficient lights provided to safeguard the workers. Lamps and shades, to be effective, must be cleaned often.

The Factor of Fatigue

The factor of fatigue in accidents should not be overlooked. The pamphlet, *Practical Methods of Reducing Fatigue*, published by the National Safety Council, says: "The average man is apt to think of fatigue as tired muscles. Actually, in such a case, it is the nervous mechanism controlling the muscles that is tired. Fatigue is recognized as being of three kinds: (1) ordinary physical fatigue due to muscular exertion, (2) mental fatigue due to the use of the mind, (3) nervous fatigue due to exhaustion of the nervous force. This is almost always the result of whipping the body to further exertion beyond the point of either physical or mental fatigue."[11] "A man who is fatigued does not see, does not hear, does not understand, and does not act with his accustomed speed. For example, he may be working on a . . . press and actually see the machine descending upon a finger, yet slowness of reaction, or of comprehension, will result in his not removing his hand in time to avoid an accident. He may hear a warning cry and dimly understand its meaning, yet his mental machinery may be so dulled by fatigue that the accident occurs before he can summon his will and wits to act. Sometimes this condition occurs because the employee has enjoyed a long evening of pleasure, and industry is not the blame."[12] Therefore, if the worker expects to be safe from accident hazards, he must be careful to get a reasonable amount of rest and sleep so as to be fresh when he goes to work. Worry, ill health, rhythm, concentration, noise, vibration, monotony, and poor light are other factors in fatigue. Proofreaders' desks should be removed from the noise of machinery.

The codes under the National Recovery Act generally contain provisions requiring employers to provide safe and healthful conditions of employment.[13] Whether or not the provision set up in these codes will become permanent now that the NRA is dead, is questionable, yet these codes contained much that would bring about safer and more healthful conditions for the printer.

[9] *Ibid.*, p. 2.
[10] *Survey of Hygienic Conditions in the Printing Trade*, p. 13 .
[11] *Practical Methods of Reducing Fatigue*, pp. 1, 2.
[12] *Electrical Safety Magazine*, June–July, 1918.
[13] *Minimum Standards for Safety and Health of the Workers in Manufacturing Industries*, p. 1.

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Steel-Rule Dies for Cut-Outs

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A bit of practical information for the instructor of the printshop. The material may also be used as related-subjects material.

THROUGHOUT the printing and lithographing industries, an amazing variety of paper, cardboard and paper-board cut-outs are being produced with steel-rule cutting dies. The term "cut-out," as used in this article, applies to any kind of printed or lithographed matter that is to be cut out to a special or fancy shape. There is an ever-increasing demand for this wide range of work, and entirely new uses for attractive paper-board cut-outs are constantly being discovered by advertising experts, printers, and lithographers.

For the most part, the designs for nearly all styles of paper or cardboard cut-outs are either printed or lithographed in several colors. Printing in metallic-ink colors is often incorporated with multicolor designs. The four-color halftone process is used for many pictorial subjects. In all cases, the sheets of stock are printed or lithographed before the designs are cut out to desired shape. Long runs are produced with

gang forms of duplicate plates, printed or lithographed on large-size sheets of stock, and for this class of work gang forms of duplicate steel-rule cutting dies are usually employed in making the cut-outs on a high production basis. Many long runs of cut-outs, however, are produced with a single die on a high-speed platen press. Among the most popular lines of color-printed cut-outs are those named as follows:

Advertising booklets; folders; broadsides; wall and desk calendars; package inserts; fancy embossed gummed labels; package seals and advertising stickers; cardboard fans; hotel menu cards; announcement folders; souvenir programs and menu folders; pictorial cardboard game and toy sets, such as bridge tallies and jig-saw puzzles, for example; greeting cards and folders; pictorial stock folders (arranged for imprinting) for specialty shops; coin-holding cards and folders; bookmarkers, valentines, window-display price cards and placards; pictorial display cards for use in retail stores, and large-size paper-board window display pieces of the many different styles which are used in connection with national advertising campaigns relating to merchandise. In addition to special shapes of cut-outs, "open-window" cut-outs are made in numerous designed covers for booklets, brochures, and programs, also to some extent, in pictorial pages for booklets and brochures.

Steel-rule cutting dies, for making cut-outs from paper, cardboard, etc., can be worked on any of the following kinds of presses: Heavy platen cutting and creasing presses, flat-bed cylinder cutting and creasing presses, platen embossing presses, heavy makes of platen printing presses (with inking rollers removed), regular flat-bed cylinder printing presses (with inking rollers removed), automatic flat-bed job cylinder presses (with inking rollers removed). With automatic flat-bed cylinder presses, however, the height of the steel cutting rules in dies should be only type high (.918 in.), and only paper and lightweight board should be run. Working conditions are altogether different with the other kinds of presses mentioned. For example, when cut-outs are to be produced on a platen press, the platen is to be equipped with a removable steel plate — thick enough to serve two purposes; namely, to protect the surface of the platen of the press from direct contact with the sharp edges of the steel-rule dies, and to form a hard, smooth surface, or counter, for contact with the edges of the dies. To provide for these same two purposes, the impression cylinder of a standard make of flat-bed cylinder cutting and creasing press is equipped with a hinged steel jacket. When a regular platen printing press or embossing press is to be used for cut-out work, temporarily, the platen may have a sheet of hard pressboard glued onto it, and the same kind of counter may be attached to the impression cylinder of a regular flat-bed cylinder printing press, for cut-out work.

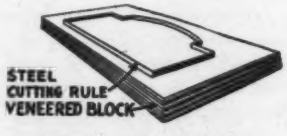


Fig. 1. A steel-rule cutting die for cutting out a special shape for a printed cardboard window-display piece

Fig. 2. A steel-rule cutting die with the bent pieces of rule inserted in a block of laminated board

How Steel-Rule Cutting Dies Are Made

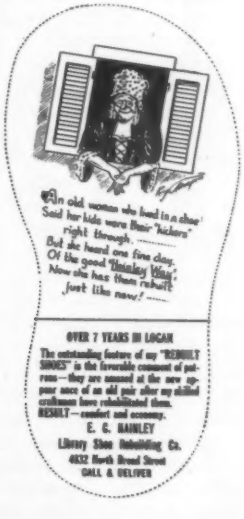
To provide for the making of all shapes, styles, and sizes of cut-out dies, steel cutting rule is manufactured in various tempers, thicknesses and heights. The five standard tempers are: Extra hard, hard, medium hard, soft, and dead soft. All these different tempers of steel rule are made in thicknesses of 1, 2, 3, 4, 5, 6, 8, 10, and 12 points, and with either center face or side face, as ordered from the manufacturer. The three standard heights are: .918 in., .923 in., and .937 in.

There are hundreds of different uses for these various tempers, thicknesses, and heights of steel cutting rule. But, the 2-point thickness and .923-in. height is used to the greatest extent in making cut-out dies for printed paper and cardboard. Thicker rule of the .937-in. height is used in making cut-out dies for thick and hard material, such as paperboard window-display pieces, and the like.

Steel cutting rule of the standard hard temper is generally utilized for straight-line sections of odd-shaped dies, also entirely for straight-line dies designed to cut out such shapes as triangle, diamond, Latin cross, keystone, step formation for a building design, pyramid, hexagon, octagon, etc. Hard and extra hard tempers of steel rule require no heat treatment for use in cutting dies.

Soft and dead-soft tempers of steel cutting rule are used in the making of fancy, odd-shaped, and the most intricate designs of cut-out dies. With the aid of a pair of pliers and a bench vise with flat jaws, the die-maker can bend strips of soft or dead-soft steel rule to any desired shape. Or, this work can be performed more accurately by means of a patented make of rule-bending press, and sets of steel male and female rule-shaping dies. After the strips of soft or dead-soft steel rule have been bent to the required shapes for cutting dies, it is necessary that the pieces of rule be hardened and tempered. The common method of hardening is to hold each piece of rule, with a pair of pliers, over a gas or Bunsen burner, until the rule becomes a cherry red; then the heated rule is dropped into a bath of quenching oil. The hardened rule is then tempered by first dipping it into a heavy type of tempering oil, then holding the rule over a gas or Bunsen burner until the oil on the rule catches fire and gradually burns off. The sides of the hardened and tempered rule should be cleaned and polished with rouge and fine emery cloth.

While the greater number of steel-rule cutting dies, both single and gang-form, are set up in mortised blocks, of either laminated board or cherry lumber, many plain and straight-line cutting dies are set up with labor-saving lead or iron furniture, type quads, leads, slugs, and brasses. All-metal cutting dies are also set up with such spacing material as linotype, intertype, and Ludlow blank slugs, sawed to fit into the open spaces of the dies; monotype quads, leads and slugs, and the new kind of montoype metal furniture, cast in any length from 12 points up to 30 in., and in type sizes from 14 points up to 72 points. It is a comparatively easy matter


"An old woman who lived in a shoe
Said her kids were Bear 'kickers'
right through.
But she heard one fine day,
Of the good "Stanley Way"
Now she has them rebuilt
feet like new!"
OVER 7 YEARS IN LOGAN
The outstanding feature of my "REBUILT SHOES" is the favorable comment of patrons — they are amazed at the new appearance of an old pair after my skilled craftsmen have rehabilitated them.
RESULT — comfort and economy.
E. G. HAINLEY
Library Shoe Rebuilding Co.
4632 North Broad Street
CALL & DELIVER

A cut-out used on a commercial advertising effort

to saw-trim long strips of this material into necessary lengths to fill in the open spaces of either cutting dies or cutting and creasing dies.

The two standard heights of both laminated board and cherry lumber are 5/8-in. and 3/4-in. The principal advantage of laminated board over cherry lumber is that blocks of the laminated board will not warp, expand, or contract to any serious extent under irregular climatic conditions. Both kinds of board are supplied in many different-cut sizes, including extra-large sizes, as ordered from dealers. Individual cutting dies may be inserted into single blocks of either laminated board or cherry lumber, and a number of duplicate cutting dies can be inserted into one extra-large block of laminated board or cherry lumber. For gang forms, individual blocks and dies may be placed together and locked up in a chase.

The manner in which a single cutting die is made with a block of either laminated board or cherry lumber is described as follows:

A pattern for the desired shape of die, cut out from a sheet of cardboard, is used by the die maker, not only in predetermining the lengths of steel rule to be cut and the shapes to which the pieces of rule are to be bent, but also in marking the shape for the die on one surface of the block. This marking is done accurately, either with a sharp-pointed tool or a hard-lead pencil. The marked diagram indicates all the lines to be mortised. In a plant where the equipment does not include a power jig saw, it is possible to mortise the block with a small hand saw of the kind known as a "key-hole" saw, or with a coping saw.

The sawing is done entirely through the block, and the marked pattern should be followed closely. It is necessary, of course, to have two mortised lines wide enough to provide for insertion of the thickness of the steel rule used for the die. This can be accomplished easily by resawing one or more times along the originally sawed sides of mortised lines in the block. The sawed sides of the block may be smoothly finished by rubbing a strip of fine sandpaper back and forth against them, through the mortised sections. When the proper mortising has been completed, the pieces of steel cutting rule are inserted tightly in the mortised lines in the block, to uniform height.

"Corking" the die is the final operation. Rows of small pieces of cork or sponge rubber are to be glued to the surface of the die block, near both sides of all cutting rules in the die. The purpose of this "corking" is to push each cut sheet of stock off the die form after each impression made by the press. In order to prevent cut sheets from falling apart as they are delivered from the press, it may be necessary to file a few, small V-shaped slots in the cutting edge of some steel rules in the die. When the run of work has been completed, piles of the cut sheets can be stripped of waste material.

Press make-ready for cut-out dies is simple. The main requisite is to adjust the impression of the press so that the cutting rule will cut through the stock sharply, without having the edge of the rule indenting the surface of the counter. Rules which are slightly low in a die form can be brought up to the proper height by underlaying them at the back of the form with strips of hard manila paper. No make-ready should be placed on the surface of the counter.

Reducing the Cost of Drafting

August Flam

John Marshall High School,
Los Angeles, California

How attendance in the mechanical-drafting classes was increased by instituting a rental system whereby students could secure the use of drawing equipment at little cost.

THE high schools in the school system in which the writer teaches mechanical drawing, furnish drawing and tracing paper, drawing ink, pencils, erasers, drawing board, and thumb tacks to the pupil. This makes it necessary for the pupil to purchase his own drafting set, T square, scale, triangles, French curve, and protractor. The cost of this equipment is considerable, and it is obvious that many pupils are kept out of the drafting classes because of lack of funds.

Inasmuch as books in most subjects, and supplies and equipment in chemistry, biology, and art classes, are furnished gratis, and in practically all the industrial-arts courses no equipment has to be purchased, it seems that a heavy penalty is being levied on mechanical drawing. Prior to 1930, however, in spite of the handicap, hardly anybody protested against spending money on drawing equipment. It was all taken as a matter of course, and in very few cases did the cost keep pupils away. Today, and since the early part of 1930, the picture is quite different. In the pupils' minds the question resolves itself to this: Provided he *could* obtain the money, would it be of any advantage to expend from five to ten dollars on equipment for a subject which he might not like, and in which he might not succeed? In some cases, spending money on school equipment cannot be considered for a moment — the family has all it can do to supply the necessary food for its members.

Facing this situation, the problem was presented to the principal, with the suggestion that funds could be borrowed, perhaps from the student-body treasury, with which to purchase equipment to rent out to students at a nominal rental, it might draw the financially disqualified group into the drafting classes.

As an experiment, a small amount was advanced, and with cautious shopping, fourteen sets of instruments were bought from a dealer who was retiring from business. Some publicity was secured through the medium of the daily bulletin at the opening of a new semester, and the enrollment jumped upward at once.

A system was worked out whereby each student who checked out a set of instruments was expected to pay the small rental fee of ten cents a month — provided he could afford to do so. Most renters were able to meet these payments. Those who could not, were requested to mention the fact privately to the instructor, to save any possible embarrassment. A nickel or a penny were accepted where larger payments were not possible. Everything was done to maintain pupil self-respect — he was either paying his way, or was rendering some slight service which would benefit the group.

More money was borrowed and more drafting sets were purchased. While only a minor portion of the loan has been repaid, we are headed in the right direction, and eventually the equipment will belong to the department. The day will then arrive when every needy pupil will be given all the necessary equipment gratis and rent-free.

It is characteristic of pupils in mechanical-drawing courses to want to own their equipment. Thus, as we climb farther and farther out of the depression, the demand for loans of equipment will diminish.

The dreaded task of asking pupils for money on the first of each month is the one drawback and disagreeable feature. But as a whole, the general feeling is that the experiment has netted dividends, which outweigh by far all the disadvantages so far encountered.

Problems and Projects

A HANDY TRIPOD

W. W. Scott, Supervisor of Industrial Arts,
Topeka, Kansas

This tripod is designed so as to be used either with a camera or a plane table. It can be made easily in the school shop, and is strong enough to withstand almost any amount of rough usage. It appeals especially to those scouts, who are making maps for their scout tests.

The top of the tripod is of 5-ply fir panel, and the legs are of oak strips, as shown in Figure 1. Before bolting a leg together, make a groove in each strip at the bottom, so that a 16d nail can be clamped between the two strips. The point of the nail should project beyond the end of the leg. This is to prevent the tripod from slipping after it is set up.

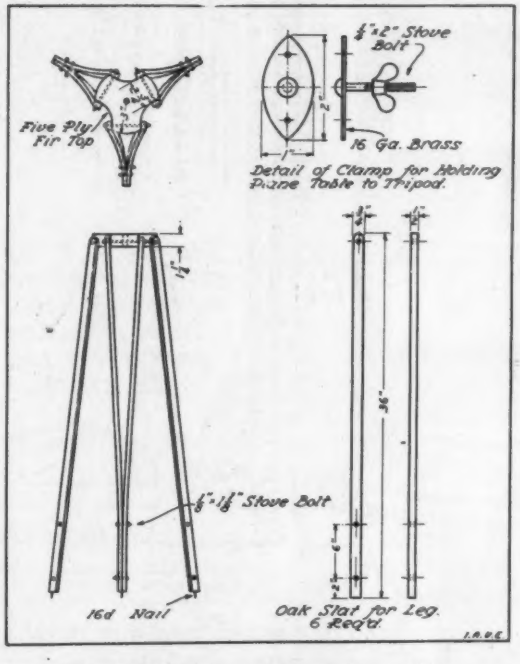


Fig. 1. Tripod for camera or plane table

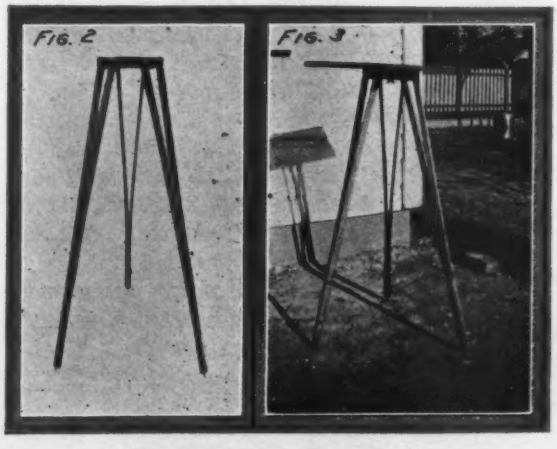


Fig. 2. The assembled tripod
Fig. 3. The plane table mounted on the tripod

The slats are bolted together at the bottom with ⅛ by ⅞-in. r.h. stove bolts, and the legs are fastened to the top piece by ¼ by 4-in. stove bolts.

A coat of shellac applied after the tripod has been assembled protects it and adds to its appearance.

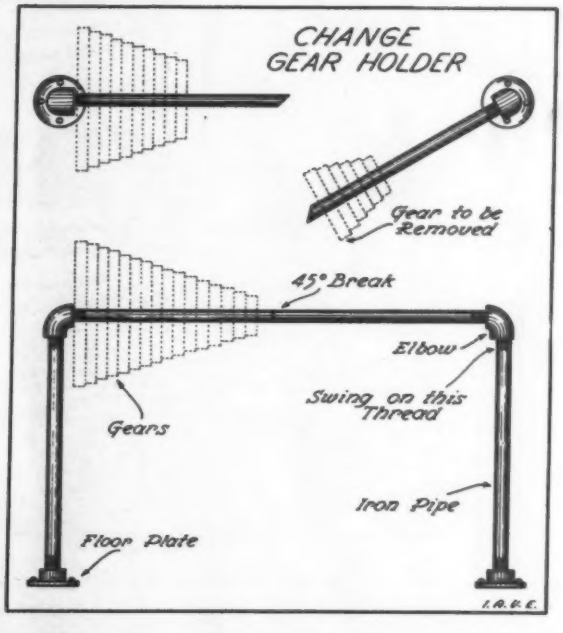
A small drawing board completes the plane table. It is fastened to the tripod by the clamp shown in the drawing. The stove bolt should be soldered or brazed to the brass plate, and the whole screwed to the underside of the drawing board. The underside of the brass plate should be set flush with the under surface of the board.

If a camera is to be mounted on the tripod, use a ¼-in. stove bolt.

CHANGE GEAR HOLDER

F. Muir, Hamilton, Ontario, Canada

Change gears, emery wheels, milling cutters, and the like, are often mounted on an upright peg to keep them together. But this system has one fault, namely, the whole lot must be lifted off if the bottom one is required.



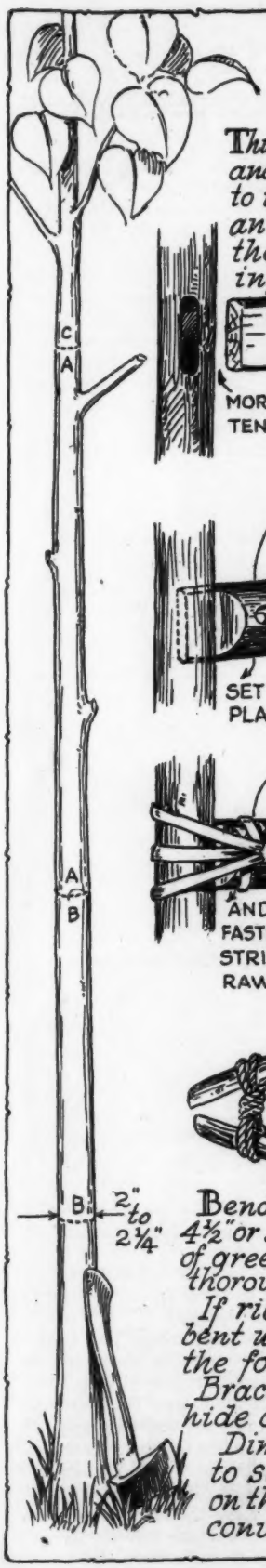
The writer recently noticed an excellent holder that eliminates this and enables any gear to be removed without disturbing the relative position of the rest.

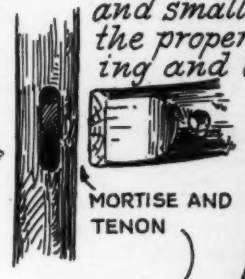
It is made entirely of iron pipe and fittings. Two lengths of pipe are threaded into end plates and these are secured to the floor. Two elbows and a horizontal pipe between them, cut at 45 deg. as shown, complete the holder. The right-hand elbow is left loose enough to turn on the vertical pipe. With all the gears in place on the holder, any one can be removed by sliding the others one way or the other until the required one is next to the break in the pipe. The pipe in the loose elbow is then swung around to make the necessary opening to remove the one wanted. After the gap between the two pipes has been closed, slide a few of the gears over the joint to keep it closed.

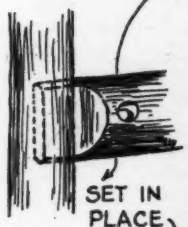
PACK RACK

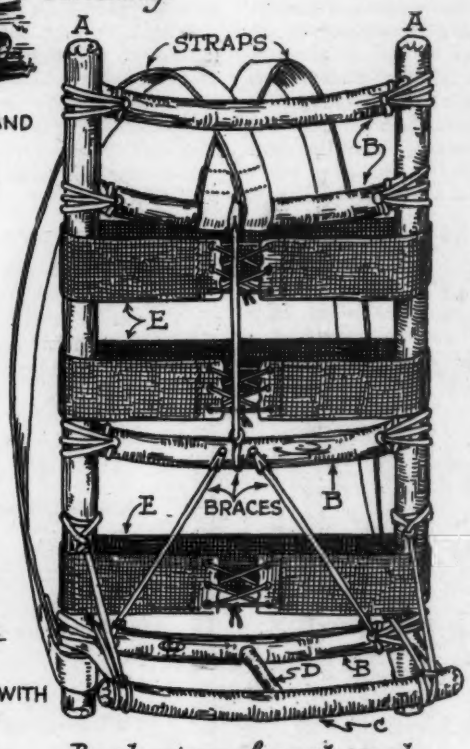
DESIGNED & DRAWN BY
W. BEN. HUNT
HALES CORNERS, WIS.
1 · 9 · 3 · 5

This frame may be made of green bass wood which is very light and easy to work, or it may be made of ash which while easy to work, is heavier and more substantial. Where saplings and small trees are plentiful, one may find pieces that have the proper curve, thus saving a lot of time and work, steaming and bending.

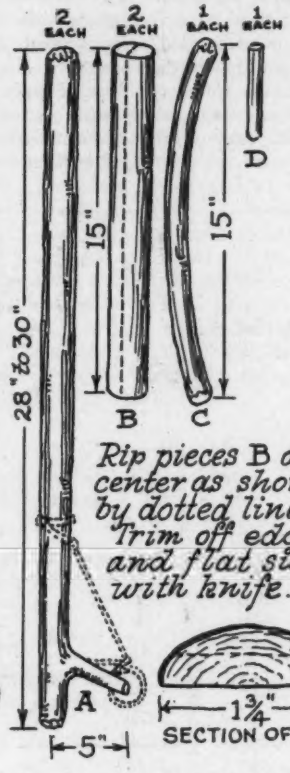








Back view of pack rack, arms slip thru straps.



Rip pieces B down center as shown by dotted line Trim off edges and flat side with knife.

Bend ribs in pairs around two 4½" or 5" logs. If ribs are made of green wood let them dry out thoroughly before removing.

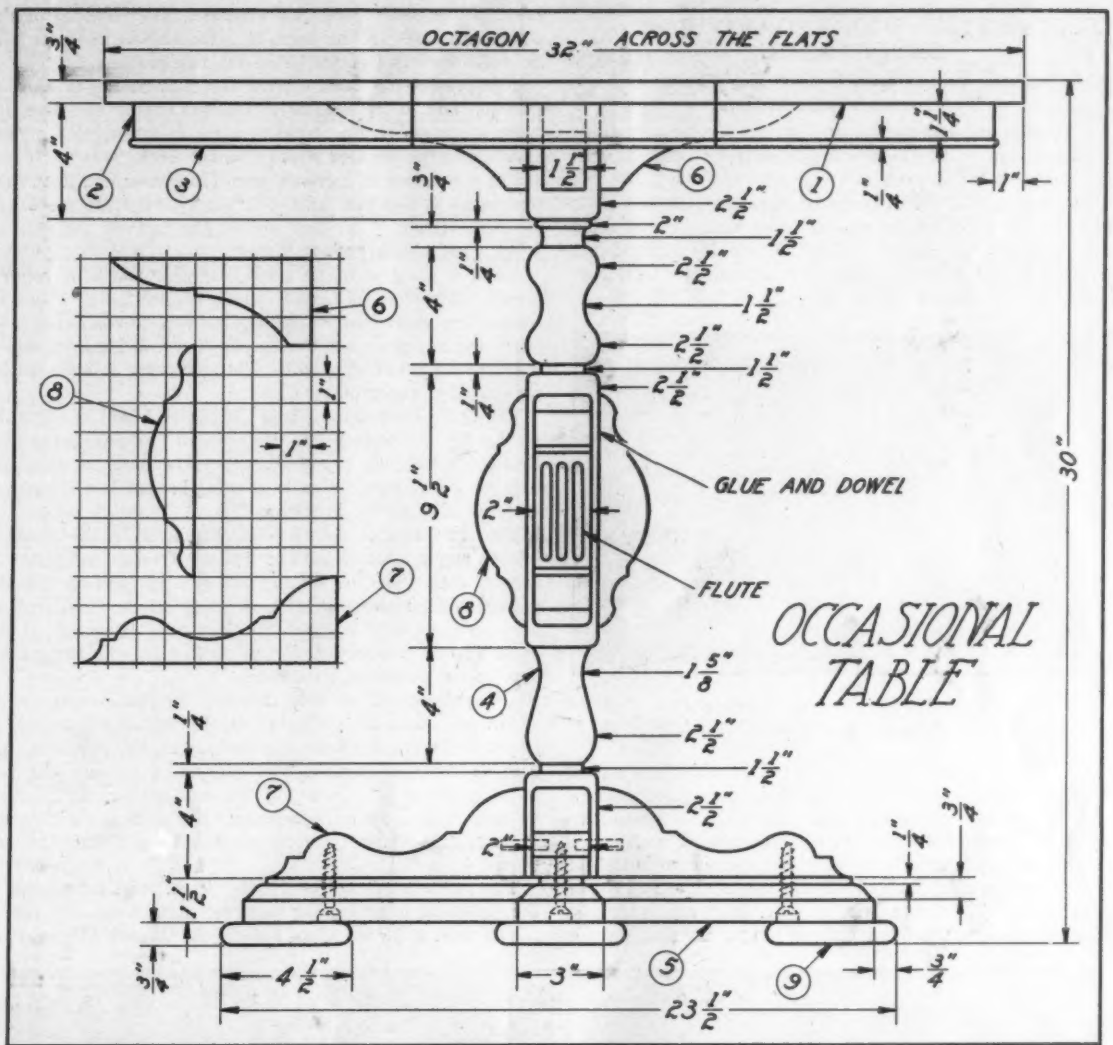
If ribs must be steamed or bent with heat, leave them on the form for a day or two only.

Braces may be made of rawhide or wire.

Dimensions may be altered to suit the wearer. Buckles on the shoulder straps are a convenience.

In true woodsman's style all joints are fastened with rawhide. Soak ¼" strips of rawhide for from 12 to 20 hours. Pull it around the joints as tight as possible. When dry the thongs will hold them tightly. Shellac the rawhide to keep out moisture.

Make bands E of 3½" upholstery webbing or heavy canvas. Fold end over and sew with heavy cord. Open webbing with a pointed stick to insert grommets. In the absence of grommets sew around the holes with heavy cord. Lace bands tightly



BILL OF MATERIALS

NO.	WTD.	THICKNESS	WIDTH	LENGTH	NO.	WTD.	THICKNESS	WIDTH	LENGTH
1	1	3/4"	32"	32"	6	4	1 1/2"	3"	7"
2	1	1"	1 1/4"	8'-0"	7	4	2"	3"	9"
3	1	1/4"	1 1/2"	8'-0"	8	4	2"	2"	8"
4	1	2 1/2"	2 1/2"	28"	9	4	3/4"	4 1/2"	4 1/2"
5	2	1 1/2"	3"	22"					I.A.V.E.

Occasional Table designed by Floyd D. King, Phoenix, Arizona

DON'TS FOR THE GENERAL SHOP

George C. Donson, Washington, Pennsylvania

1. Don't talk to anyone operating a machine.
2. Don't wear loose clothing or flying neckties. They cause accidents.
3. Don't wear rings on your fingers while working at a machine.
4. Don't forget to stop your machine when taking measurements or when oiling.
5. Don't use a file without a handle, either at the bench or at the lathe.
6. Don't have anyone assist you when using the squaring shears. He may trip the shears at the wrong time.
7. Don't use any machine until you are sure that it is ready for use.
8. Don't fail to use a little rosin when pouring babbitt metal. Rosin dries out the dampness and prevents blowing.
9. Don't forget to wear goggles when pouring metal.
10. Don't forget that a clean shop is a safe shop.

REMOVING RUST FROM STEEL TOOLS

Immerse the rusty tool for 10 to 12 hours in a solution made by dissolving chloride of tin in distilled water until a saturated solution has been obtained. Then rinse off the tool in running water and dry thoroughly.

ELECTRIC SCOREBOARD FOR BASKETBALL

Hugh J. Eisenhauer, Senior High School, Watertown, Massachusetts

This scoreboard will make a fine project for the industrial-arts department of any high school equipped to do machine-shop and sheet-metal work.

It is not only a useful piece of apparatus, but it is an inspiration to every player on the home team to run up a score. It gives the player a thrill to see his score being registered by the mere pressing of a button. The total cost of material should not exceed $35.

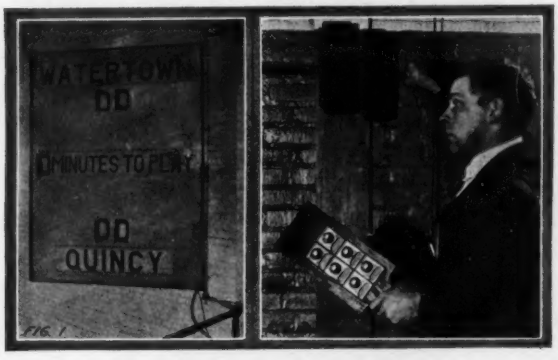


Fig. 1. The face of the scoreboard
Fig. 2 Plugging in the switchboard

This board is operated by means of disks which are turned by the pull of weights and released by means of electro-magnets. The disks are spaced in ten parts. Games are usually played in eight-minute periods, and the last of a game or the amount of time left to play is most important. The minutes-to-play disk, instead of the figure nine, has figure ½ indicating ½ minute left to play. The names of the different teams are painted on plates and inserted on the front of the scoreboard. See Figure 1. The lettering of the plates and disks can be done by some boy in the class who likes the work and shows talent for sign painting.

This project has been carried out even to the making of drawings and to the winding of the magnets by the boys. Its construction covered a period of one school year with a class of twelve boys working four periods a week.

The scoreboard is operated from the gymnasium floor near the center at the side lines. The wires to operate the board are run through ¾-in. pipe around the balcony and wall to a block containing contact points.

When a game is to be played, another block of contact points, connected to flexible wires, is inserted in the wall block. The other end of the flexible wire is connected to a board containing six bell buttons, as shown in Figure 2, which is placed on the timer's table. The scoreboard is operated by pressing the proper buttons.

The buttons are arranged on the button board as the disks are on the scoreboard. To the right of the minutes-to-play button is the bell or horn button to be used to start and stop the game. The bell or horn being located in the inclosed scoreboard as shown in Figure 3.

The wire used to operate the scoreboard is the common bell or annunciator wire. The number of wires necessary is one for each disk, one for the bell or horn, and one for the ground wire, making a total of seven wires. It is best to have an extra wire in case of a short or open circuit. If the extra wire is not needed, it can be tied in with the ground wire to cut down the resistance.

The pull of the weights through the picture-wire cables which pass over idler sheaves at the top of the board, as shown in Figure 3, rotates the sheave casting, and it in turn acts on the disk casting. The connection between the two is by means of the contact of the ends of the spiral springs on lugs on the castings, which gives the disks an easy motion and cushions easily the pawls and spacing disks shown in Figure 4.

The pawls are made of 1½ by ½-in. steel drawn out at the forge and offset, giving them the appearance of a forged boring tool. A ⅝ by ¾-in. hole is cut through the pawl for

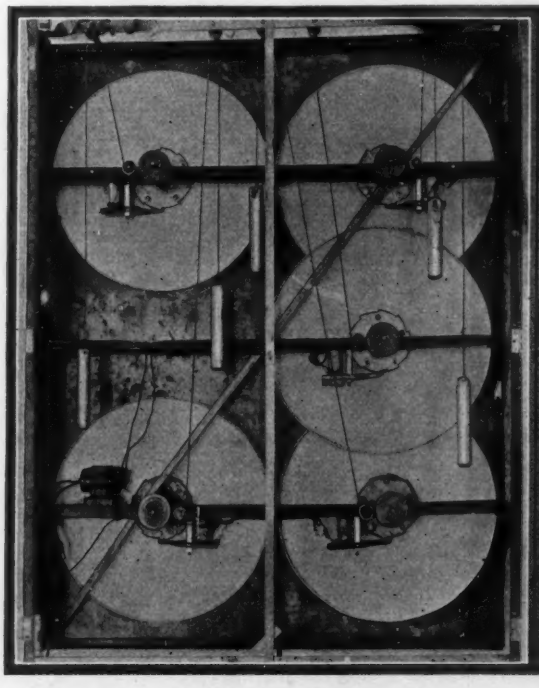


Fig. 3. The switchboard as seen from the rear

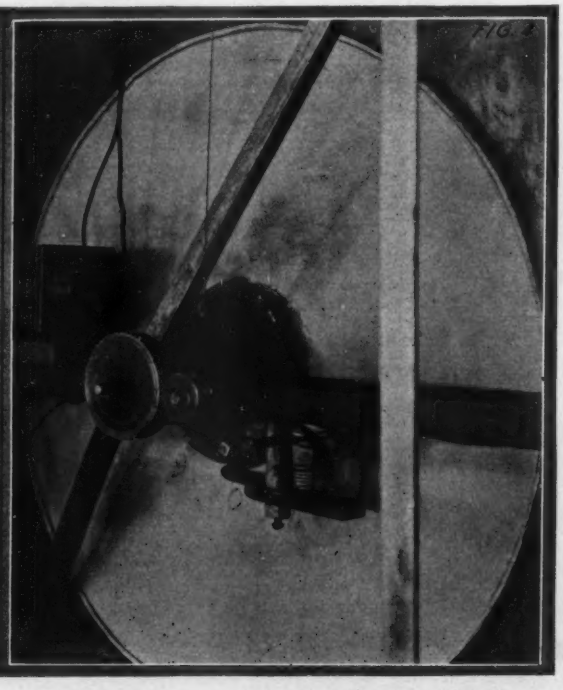
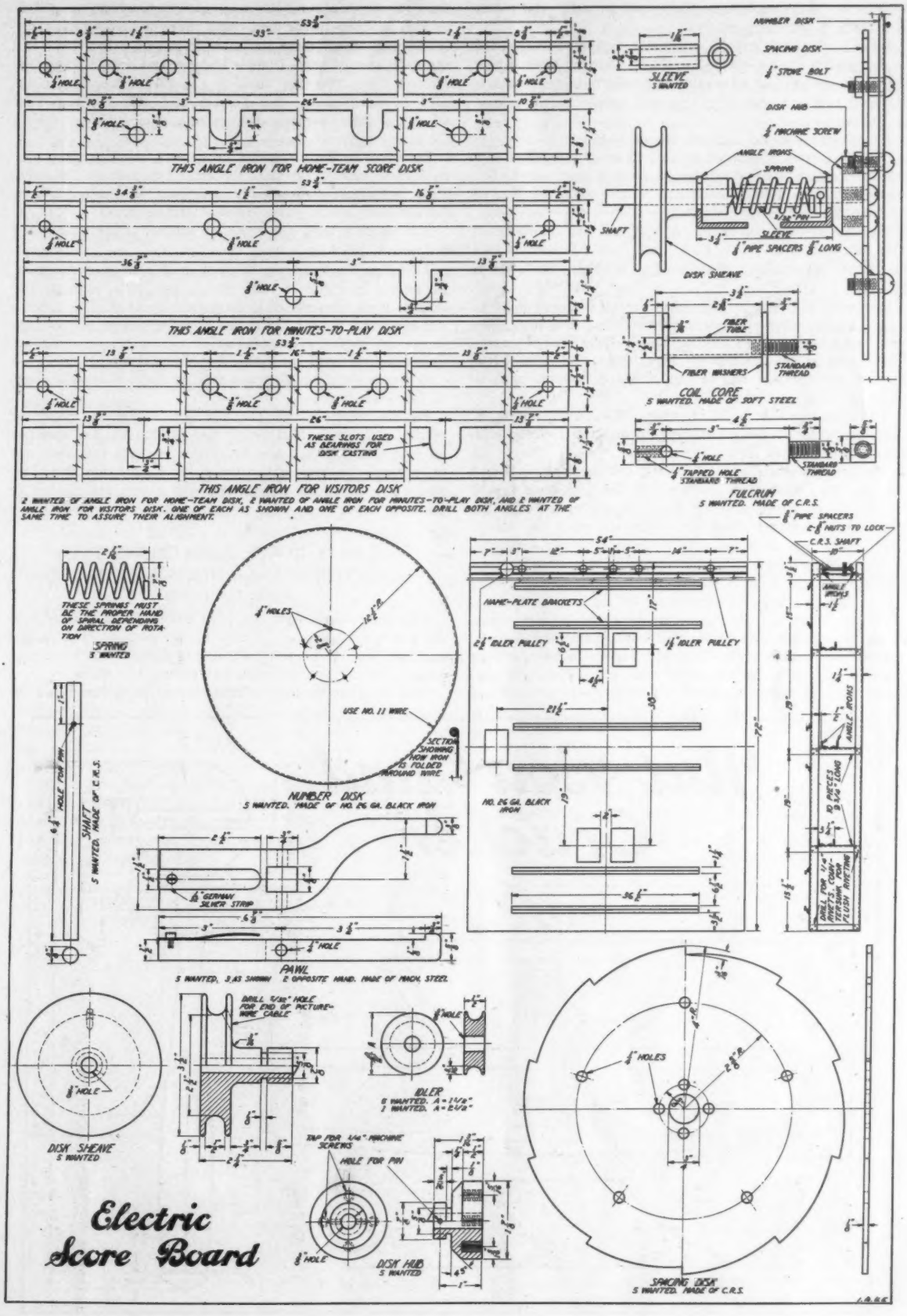


Fig. 4. A close-up of the operating-disk mechanism


THIS ANGLE IRON FOR HOME-TEAM SCORE DISK
THIS ANGLE IRON FOR MINUTES-TO-PLAY DISK
THESE SLOTS USED AS BEARINGS FOR DISK CASTING
THIS ANGLE IRON FOR VISITORS DISK
2 WANTED OF ANGLE IRON FOR HOME-TEAM DISK, 2 WANTED OF ANGLE IRON FOR MINUTES-TO-PLAY DISK, AND 2 WANTED OF ANGLE IRON FOR VISITORS DISK. ONE OF EACH AS SHOWN AND ONE OF EACH OPPOSITE. DRILL BOTH ANGLES AT THE SAME TIME TO ASSURE THEIR ALIGNMENT.
SLEEVE
5 WANTED
NUMBER DISK
SPACING DISK
1/4" STOVE BOLT
DISK HUB
1/4" MACHINE SCREW
ANGLE IRONS
SPRING
SHAFT
1/4" PIN
SLEEVE
1/4" PIPE SPACERS 5/8" LONG
DISK SHEAVE
FIBER TUBE
FIBER WASHERS
STANDARD THREAD
COIL CORE
5 WANTED. MADE OF SOFT STEEL
1/4" TAPPED HOLE STANDARD THREAD
STANDARD THREAD
FULCRUM
5 WANTED. MADE OF C.R.S.
THESE SPRINGS MUST BE THE PROPER HAND OF SPIRAL DEPENDING ON DIRECTION OF ROTATION
SPRING
5 WANTED
1/4" HOLES
USE NO. 11 WIRE
SECTION SHOWING HOW IRON IS FOLDED AROUND WIRE
NUMBER DISK
5 WANTED. MADE OF NO. 26 GA. BLACK IRON
NAME-PLATE BRACKETS
2 1/2" IDLER PULLEY
1 1/2" IDLER PULLEY
NO. 26 GA. BLACK IRON
1/4" PIPE SPACERS
2 NUTS TO LOCK
C.R.S. SHAFT
ANGLE IRONS
10 PIECES 3 1/4" LONG
DRILL FOR 1/4" FLUSH RIVETING
HOLE FOR PIN
SHAFT
5 WANTED. MADE OF C.R.S.
GERMAN SILVER STRIP
PAWL
5 WANTED, 3 AS SHOWN 2 OPPOSITE HAND. MADE OF MACH. STEEL
DRILL 1/16" HOLE FOR END OF PICTURE-WIRE CABLE
DISK SHEAVE
5 WANTED
IDLER
6 WANTED. A = 1 1/2"
1 WANTED. A = 2 1/2"
TAP FOR 1/4" MACHINE SCREWS
HOLE FOR PIN
DISK HUB
5 WANTED
1/4" HOLES
SPACING DISK
5 WANTED. MADE OF C.R.S.
Electric Score Board

a piece of 5/8-in. square steel to pass through, which acts as a fulcrum for the pawl.

Between the pawl and the end of the magnet, and fastened to the pawl, is a piece of 1/32 by ½-in. German silver, which acts as a spring and also as a magnetic insulator between the pawl and iron core of the magnet, giving instant release to the pawl.

The electromagnetic coils are wound in the lathe on a ⅜-in. diameter core. Care must be used to insulate winding wire from the metal core by using a fiber or rubber sleeve. The amount of wire used in each coil is one pound of No. 18 or No. 20 d.c.c.

The size of each coil is 2½ in. long and 1¼ in. diameter. The transformer used is a G. E. No. 2134–100 watts which has 3 voltage changes. The voltage used on the coils is 30 volts.

We found that a 6-in. bell did not make sufficient noise to stop the game when spectators were cheering in a large gym, so an auto horn was installed which gives the desired results.

The general construction of the scoreboard is left to the teacher, and the material he can obtain or has on hand, in order to keep the cost low.

The frame, which is 54 in. wide, 70 in. high, and 9 in. deep, is made up of 1¼-in. angle iron, and covered with No. 26 gauge black iron.

The front is made with two sheets and has a vertical lock seam in the middle. The openings for the figures are 4½ by 6½ in. These openings must be cut out ½ in. less and turn in a ¼-in. hemmed edge. The disks are made of No. 26 gauge black iron 25 in. in diameter with a No. 11 wire edge.

The spacing disks, as shown in Figure 4, are made from cold-rolled steel, 8 by 8 by ⅛ in.; centers to be drilled to ¾-in. diameter to fit a turned hub on the hub castings, as shown in Figure 5. Drill 5 holes for round-headed stove bolts, to fasten spacing disks to large disks. Fasten the 5 plates together with stove bolts. Then place them on an arbor and turn them to 8 in. in diameter. Next, place them on index centers on the milling machine, and with a side cutter, notch the 10 spacings about 3/16 in. deep. The notchings may then be filed tapering to the next notch, using a coarse file.

The angle-iron frame that the disks rotate in is 1¼ in., and each pair of angle irons is laid out and drilled. Then cut through from the edge, making a U-shaped opening to be used as bearings for the sheaves and disk castings. This allows the shafts with the disks to be removed without taking the frame apart.

Referring to Figure 3, the upper left, middle, and lower right disks turn to the left; the other two turn to the right. Then, referring to Figure 5, care must be taken to have correct hand spiral spring between the castings.

The weights used are common window weights weighing between 3 and 4 lb.

This scoreboard is easy to keep in order if made to swing as shown in Figure 1. All that is necessary to raise the weights is to turn the disks backward by hand. The weights will not reach the bottom of the board until two full average games are played. The painting of the figures on the disks should be left until the whole board is assembled.

Before assembling, give the number disks at least 2 coats of flat white paint.

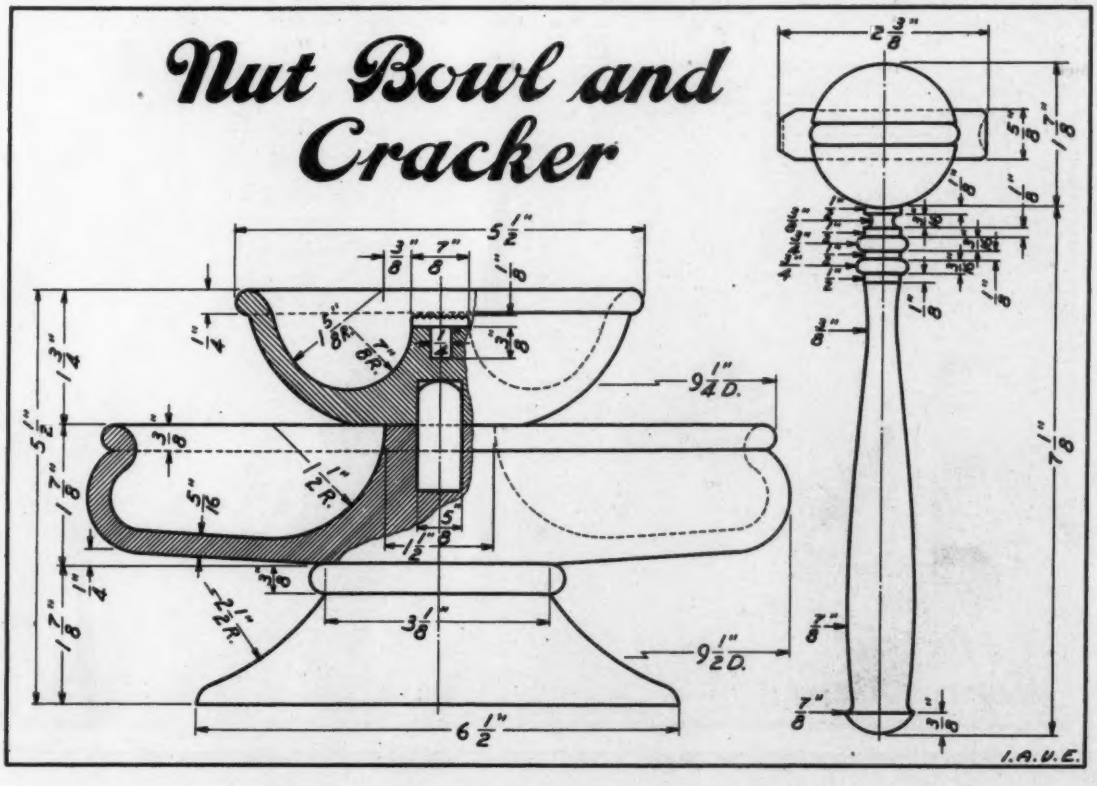
Having assembled all the parts, it is then necessary to mark lightly with lead pencil the outline of the openings on each disk for each spacing. Then the disks are taken out after which the figures are painted on. Each figure should be about 4 by 6 in. Be careful that the figures are painted in the right order of rotation on each disk.

A NUT BOWL AND CRACKER

Esmonde Harper, Union High School, Huntington Park, California

The dimensions of the nut bowl are such that lumber 2 in. thick may be used for building up the sections. The middle section is for the nuts and the hammer, while the top section is used for cracking the nuts and holding the shells.

The brass pieces, the one used on top of the bowl and the



piece in the hammer, can be turned in the school machine shop or bought at a nominal cost.

Practically any kind of wood with the exception of pine could be used to advantage. The writer used figured gum and walnut very successfully.

The top is doweled to the middle section with a 5/8-in. dowel pin. The part that holds the shells can then be removed at will and the shells emptied without disturbing the rest of the bowl.

By screwing the sections on separate 3-in. faceplates, the work can be completed systematically. A French polish, shellac and oil, gives a satisfactory finish for the project, or if one desires, a stain-varnish finish may be used.

After the three sections are completed, the bottom should be screwed or doweled to the middle section, and felt glued to the bottom surface.

The holes are then bored in the middle and top sections, and the dowel pin and brass inserted, the pin being glued in place and the brass being shellacked in the hole in the top. The brass in both the bowl and hammer can be brushed with lacquer or a solution of celluloid and ether to keep it from corroding.

The hammer is made of the same material as the bowl and is turned from a solid piece of wood. A hole is bored in the head after the hammer is turned and polished. The brass used should be turned to a snug fit. Shellac may be brushed in the hole to hold the piece in place, or a pin located as in the drawing will answer the purpose.

The theory of the hammer is that the weight of the brass in the head is heavy enough to crack the nuts; so instead of using it as a hammer, use it as a handled weight.

FRAME FOR FOOTBALL TACKLING DUMMY

Fred McGinnis, Union High School, Santa Paula, California

The construction of projects used in the athletic department of the school always creates a great deal of interest. The one described herewith is especially suited for holding the student to the job, for football is the keyword of athletics in most schools.

The project involves such problems as planning the job, making out the bill of material, studying the stresses and strains, bracing the construction, and making welds. If galvanized pipe is not used, the pipe should be painted with an outside weatherproof finish.

COPING-SAW GUIDE

Jos. J. Lukowitz, Milwaukee, Wisconsin

Some beginners in woodworking seem unable to judge when the blade of a coping saw is level and pointing straight ahead. This, of course, is largely responsible for their poor sawing. The other factor is lack of control. A demonstration, and then a few minutes' use of a coping saw fitted with the guide or indicator shown in Figure 1, will usually make the boy conscious of what *straight ahead and level* means, and it will not take long before his sawing will improve.

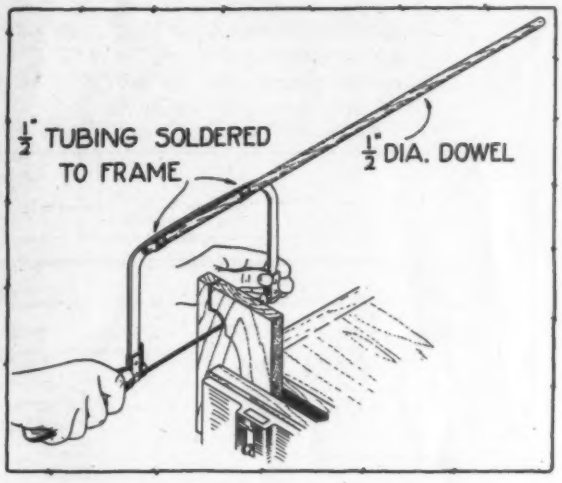


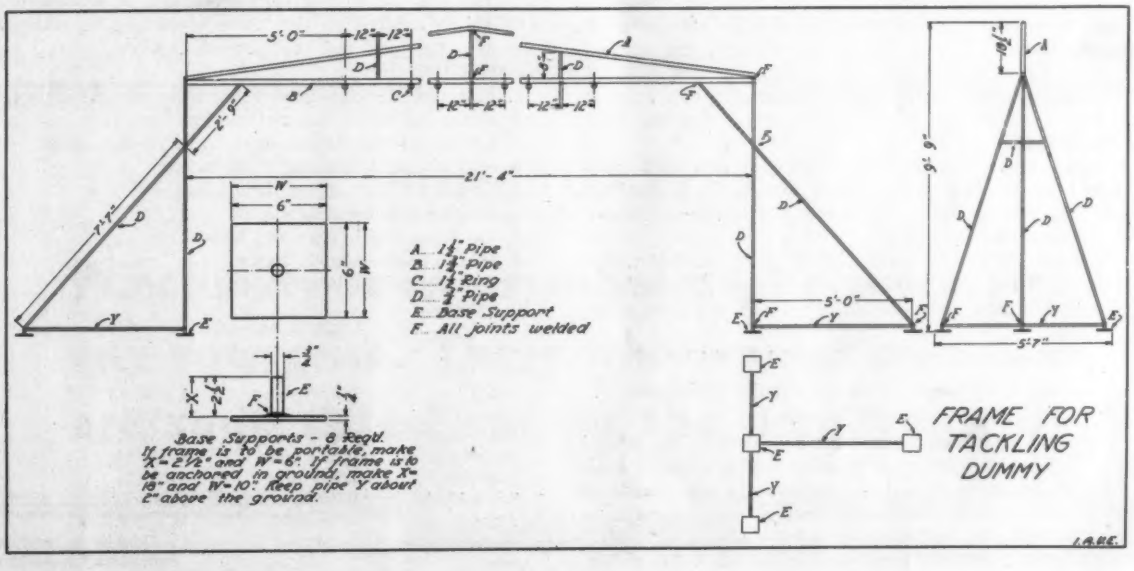
Fig. 1. Coping-saw guide

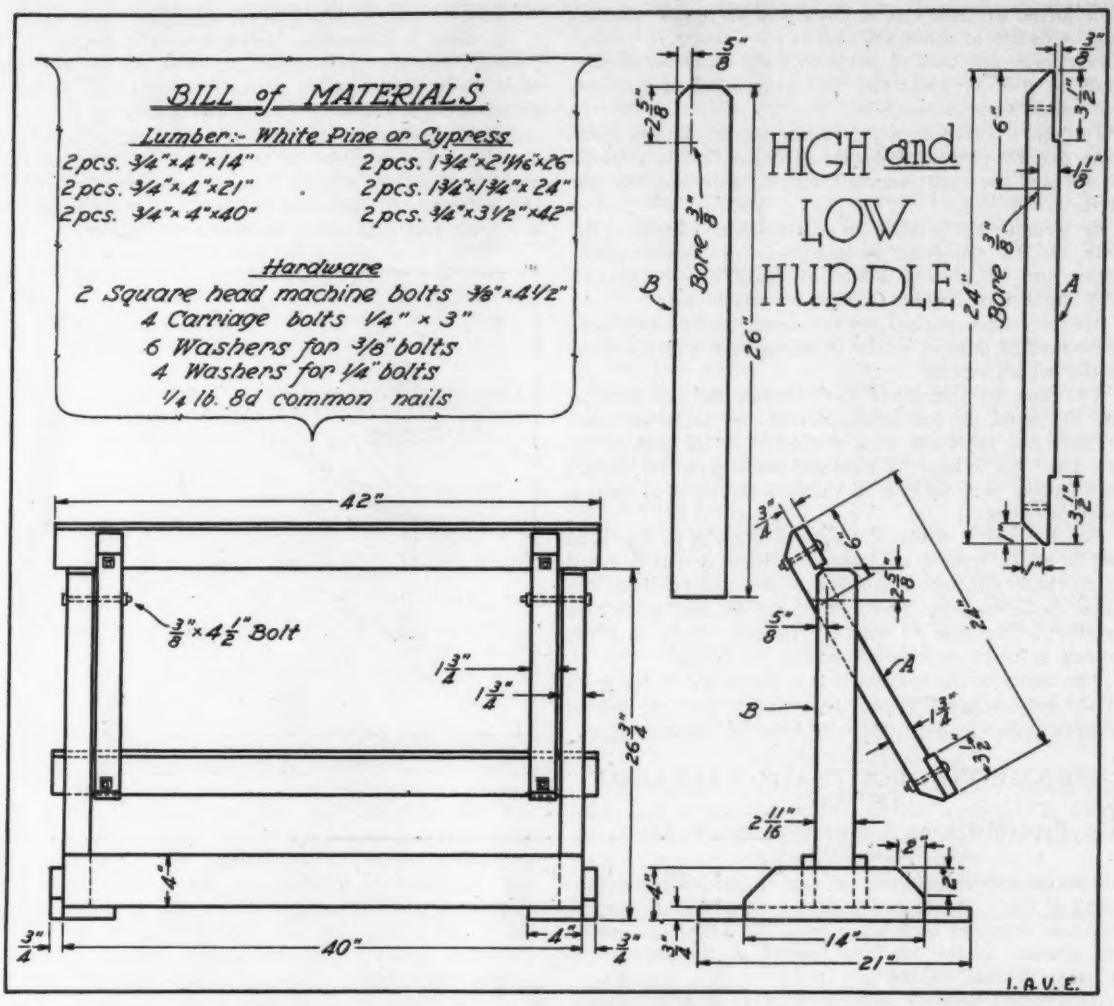
It will suffice if one or two saws are fitted out with these guides, because only a few minutes' use of this device will convince a boy of the significance of *straight ahead and level*. Of course, this guide will not dispense with the necessity of giving careful instruction and demonstration of the proper use of the coping saw. The device, however, will aid the student in learning more quickly, just how the coping saw should be used.

HIGH AND LOW HURDLE

A. Q. Bennett, High School, Urbana, Illinois

The high and low hurdle shown in the accompanying illustration was made in the industrial-arts department of the


A 1 1/4" Pipe
B 1 1/4" Pipe
C 1 1/4" Ring
D 3/4" Pipe
E Base Support
F All joints welded
Base Supports - 8 Req'd.
If frame is to be portable, make X = 2 1/2" and W = 6". If frame is to be anchored in ground, make X = 18" and W = 10". Keep pipe Y about 2" above the ground.
FRAME FOR TACKLING DUMMY



Urbana High School. The lumber used was standard lumber-yard stock.

The hole at the top of the standard is bored off center in order to allow the cross bars to stand vertically, either in the high or low position, without notching the standards.

The outer edges of the cross bars should be rounded or beveled for the safety of the hurdler. The rails are notched to make the cross bars more rigid. The rails and bars are bolted together with ¼-in. carriage bolts. The bolt holes in the rails are bored off center to correspond with the holes in the standards.

The cross bars are fastened to the standards with ⅜-in. square-head machine bolts. Three washers were used on each bolt, one on each end of the bolt, and one between the standard and the rail.

To finish the hurdle, sand it with No. 1 sandpaper, and then give it two coats of lead and oil paint. The color is optional. We use a light gray in preference to a pure white.

HAND-POWER SCROLL SAW

Gerald L. Waltrip, Public Schools, Oklahoma City, Oklahoma

The hand-power scroll saw described herewith has proved to be very popular with students and teachers alike. Although rather simple in design it is by no means a toy. Scrolls of any design may be cut out square and smooth, no surfacing being necessary if fine-toothed coping-saw blades are used.

The author feels that this problem is best adapted to eighth-grade students, but with slight changes to make construction easier or harder, it may be used in 7A or ninth-grade classes. This depends, of course, on the curriculum of various schools.

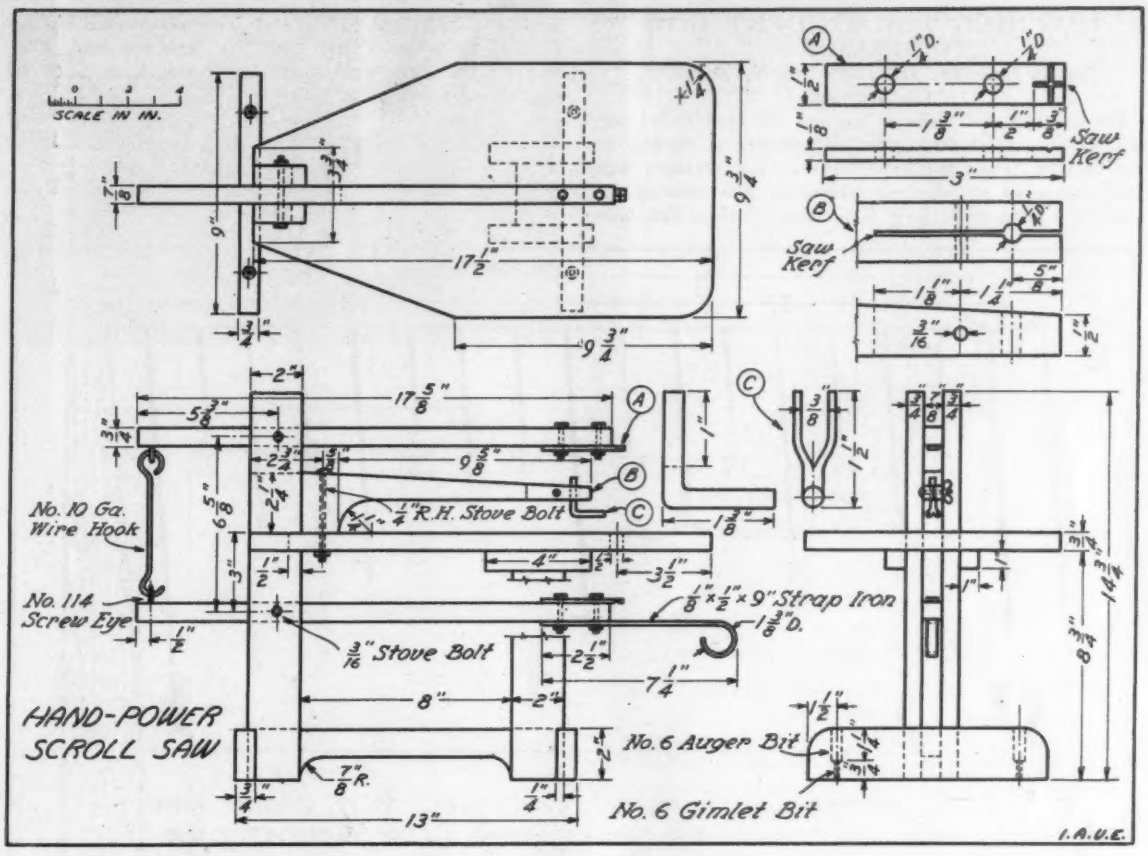
Below are listed some of the fundamental woodwork operations found in the making of this problem. It is suggested as an aid to the teacher that these operations be outlined along with the tools and tool processes.

Woodwork Operations:

1. Blueprint study.
2. Filling out bill of material and figuring cost.
3. Laying out and cutting stock to rough dimensions.
4. Surfacing and squaring stock to size.
5. Laying out and cutting dado joints.
6. Shaping and surfacing curves.
7. Fastening with screws and bolts.
8. Boring holes — depth boring.
9. Common assembly procedure.
10. Finishing.

Bill of Material

No. Required	*Name*	*Material*	*Size*
1	Table	White pine	1 x 9¾ x 17½
2	Feet	White pine	1 x 2 x 9
2	Back legs	White pine	1 x 2 x 14¾
2	Front legs	White pine	1 x 2 x 8¾
1	Spreader	White pine	1 x 2 x 12
2	Screw blocks	White pine	1 x 1 x 4
2	Arms	Gumwood	¾ x ⅞ x 17⅝
1	Pressure arm	Gumwood	1 x 2¼ x 13



Hand-Power Scroll Saw designed by Gerald L. Waltrip, Oklahoma City, Oklahoma

2	Blade holders	Strap iron	1/8 x 1/2 x 3
1	Pressure foot	Strap iron	1/4 D. x 2 7/8
1	Handle	Strap iron	1/8 x 1/2 x 10
2	Screw eyes		No. 114
1	Stove bolt		1/4 x 3 r.h.
4	Stove bolts		3/16 x 1 r.h.
2	Stove bolts		3/16 x 2 3/4 r.h.
1	Carriage bolt and wing nut		3/16 x 1 1/4
14	Screws		1 1/2" — No. 10 f.h.b.
2	Screws		1 1/2" — No. 10 r.h.b.

A plain enamel finish is suggested for this problem. To add variety, the arms are sometimes finished in different colors.

FOR YOUR BULLETIN BOARD

POSTER 65 **NOVEMBER, 1935**

PUNCTUALITY

Punctuality is an essential to the success of any enterprise. Those who are not punctual are soon sifted out by the management.

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Submitted by Professor L. M. Roehl, Cornell University, Ithaca, New York

TEACHING THE STUDENT HOW TO MEASURE

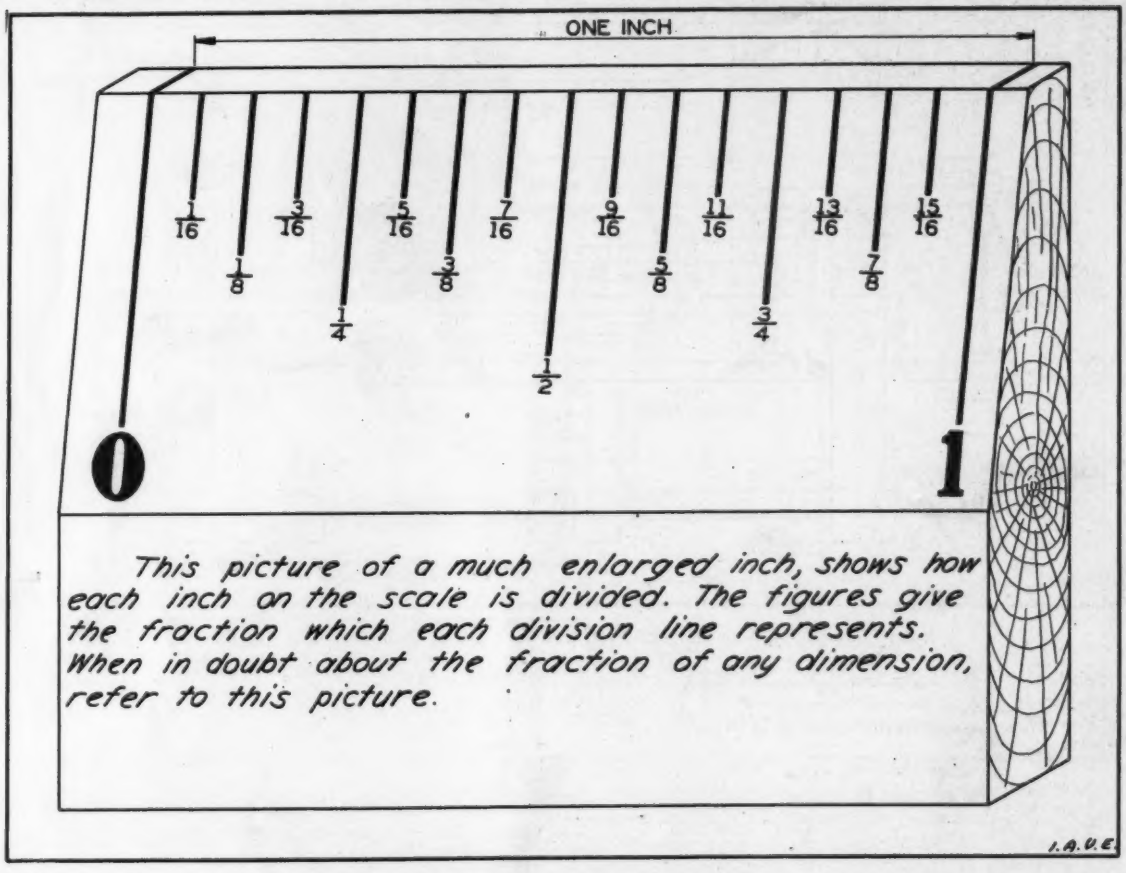
Charles Quinlan, Jr., High School, Stratford, Connecticut

The teaching device shown herewith has been found very helpful by those students who have trouble in reading the rule or scale. The illustration shows a much enlarged inch, each graduation of which is numbered. The drawing was made on a piece of 10½ by 8-in. tracing cloth so that blueprints could be made for those students who needed instruction in this phase of the work. The inch was made 8 in. long so that all numbers and graduation lines could be plainly and prominently shown.

SELF-CLEANING DRILL BLOCK

A. Moore, Hamilton, Ontario, Canada

The drill block shown in the illustrations is a labor-saver. It consists of a base of hardwood or cast iron to which is



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POSTER 66 **NOVEMBER, 1935**

ABILITY

He who can use tools, materials, and skills, and do construction and repair jobs in the least time, has preference over the rest.

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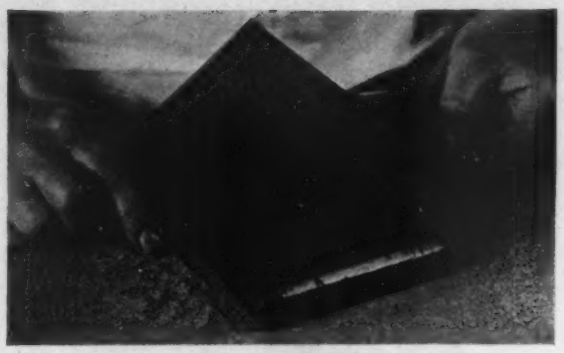


Fig. 2

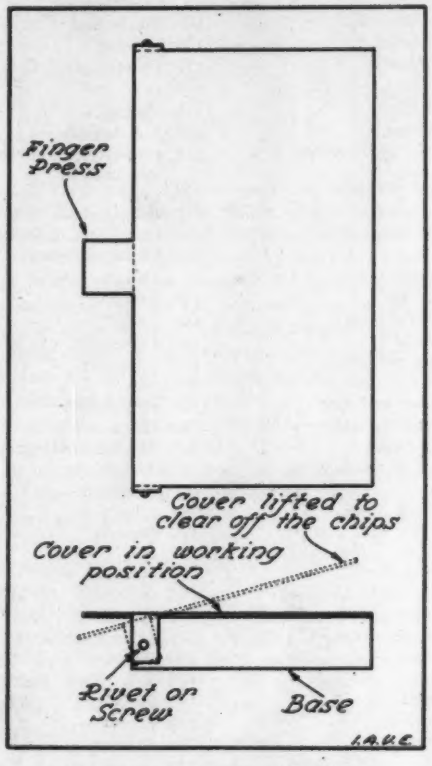


Fig. 1. Self-cleaning drill block

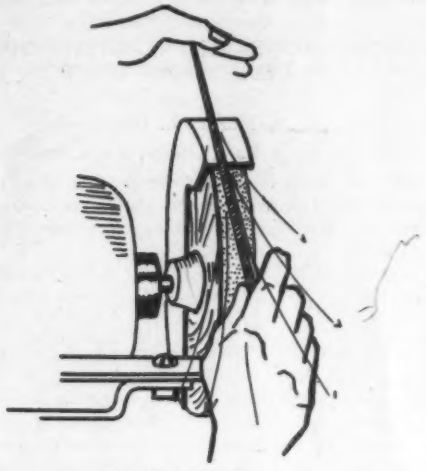
attached a cover made of sheet metal. The cover is cut out as shown in Figure 1. The two ends are turned down so that it can be held to the block by rivets or screws, and a piece is left in the middle for a finger press.

With this block in use, all the operator has to do to clear away the drill chips is to tip the cover up as shown, and the chips roll down the incline.

A USEFUL BURNISHER

A. V. Boluka, Hadley Vocational School, St. Louis, Missouri

The burnisher described herewith is made out of a worn 6- or 7-in. slim or extra-slim taper file. Grind off the file cuts on the three sides, being careful to follow the contour of the file from tange to tip. Extra caution should be taken not to burn any part of the file, as the success of the burnisher depends upon the extreme hardness of the steel out of which it is made. It is advisable to have the three sides ground flat with the corners slightly rounded. In grinding, hold the file lengthwise on the face of the wheel as shown in the illustration. Next, hone the sides and corners to a perfect smoothness so that no scratch or roughness is visible on any part of it. If a buffer is available, polish the entire burnisher with tripoli or crocus. Drive the burnisher into a suitable handle and it is ready for use.

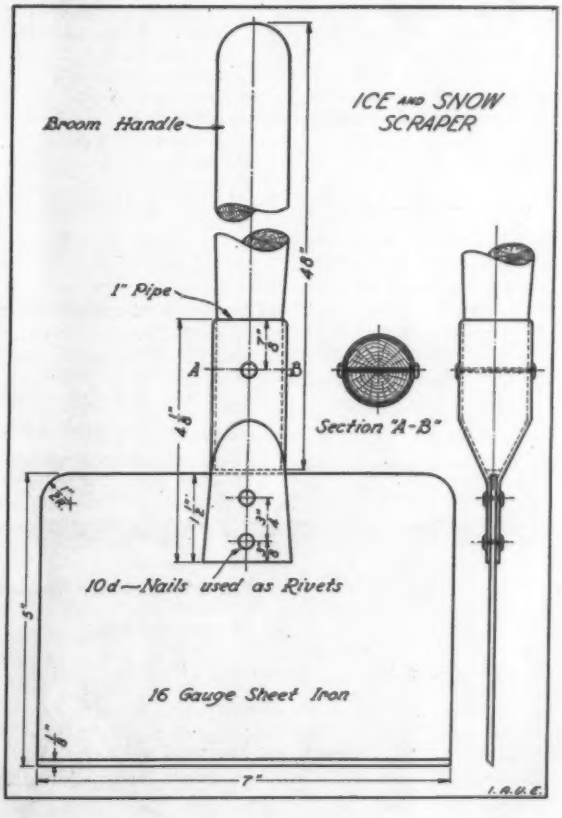


Grinding the file

ICE AND SNOW SCRAPER

L. F. Barocci, Cudahy High School, Cudahy, Wisconsin

This project has proved very popular in our eighth-grade home-mechanics shop. Tool operations representative of the metal trades are stressed, such as the use of the cold chisel, hack saw, pipe cutter, metal snips, and riveting. The blade is cut to dimensions with a cold chisel or snips. A 1½-in. slit is made lengthwise in the center of the pipe with a hack



saw. The pipe is then heated in a gas furnace and hammered flat to fit the blade. Holes are then drilled for rivets. A heavy broomstick is shaped with a spokeshave to fit inside the pipe ferrule. The three pieces are then assembled, using 10d common nails as rivets.

TENTATIVE SCORING KEY FOR SHOP TEACHERS TEST

(See page 321)

William L. Hunter

Iowa State College, Ames, Iowa

NOTE: In some instances several variations to the following answers will occur. The item should be scored right if the student indicates that he probably possesses the correct information.

1. apprenticeship
2. alcohol
3. 30 in.
4. saws
5. sloyd
6. Franklin
7. static
8. Griffith
9. Menomonie, Wis.
10. surface 2 sides
11. Bruce Publishing Co.
12. ohm
13. armature
14. clean soldering coppers
15. burnisher
16. joists
17. *Industrial Education Magazine*
18. period furniture
19. Allen
20. Selvidge, Tustison
21. period furniture
22. silver, brass, spelter
23. median
24. Bennett, Anderson
25. University of Missouri
26. Manual Arts Press
27. zinc
28. furniture, woodworking machinery, wood-finishing supplies
29. dado
30. tests
31. trade analysis, trade education
32. burl
33. Peoria, Ill.
34. 8–10d common
35. southeast
36. ash
37. University of Minnesota
38. sulphuric, H_2SO_4
39. nibs
40. horsepower, h.p.
41. zinc
42. frog
43. Selvidge
44. bows
45. bond
46. Tustison
47. cotter key, cotter pin
48. electricity
49. 6–12
50. Stanley
51. A. F. of L., labor organizations
52. Chicago
53. drafting
54. Pittsburgh, Pa.
55. 12
56. electrical resistance
57. carbon content
58. Kansas City, Kans.
59. California
60. hydrometer
61. *Industrial Education*
62. pitch, lead
63. zinc
64. specific gravity
65. *Manual Training Magazine*
66. Milwaukee, Wis.
67. tang
68. rabbet
69. lead and tin
70. draft
71. Dewey, Bode, Finney, Judd, Kilpatrick
72. mechanical drawing
73. Columbia University
74. educational philosophy, methods of teaching, educational psychology
75. volt
76. induction
77. escutcheon
78. *Industrial Arts Design, Pewter Design and Construction*
79. Columbia University
80. points per inch
81. electricity
82. Minneapolis, Minn.
83. Mays
84. southwest
85. Columbia University
86. isometric
87. curriculum construction
88. French
89. Hjorth
90. mechanical-aptitude tests
91. alloys
92. Fryklund
93. *Handwork in Wood, Design and Construction in Wood, Wood and Forest, Woodworking Machinery*
94. Ohio State University
95. number of threads per inch
96. carbon
97. blueprinting
98. casehardening, carbonizing, carburizing
99. Stout Institute
100. ductility
101. 1917
102. The General Shop
103. Pittsburgh, Pa.
104. auger bits
105. University of Illinois
106. South Bend Lathe Works
107. New York, N. Y.
108. Stout Institute
109. Woodward
110. 3/16 in. = 1 ft.
111. Pestalozzi
112. ethical character, worthy use of leisure, citizenship
113. Brown
114. borax
115. reverse any two leads change the phase rotation
116. Bawden, Bauder, Bowman, Ericson, Proffitt, Roberts, Selvidge
117. probable error
118. University of Wisconsin
119. Wright
120. 1876–1885
121. ammonia, NH_3
122. Rousseau
123. Dunwoody
124. 22–28
125. Bowman
126. mullions
127. Firsts and Seconds
128. 60 deg.
129. John J. Metz
130. Wisconsin
131. cold rolled
132. rosin
133. 60 deg.
134. Bradley
135. wood finishing
136. Detroit
137. auto mechanics
138. flask
139. copper and zinc
140. elasticity, resiliency
141. commutator
142. watt hour, K.W.H.
143. sm
144. lignum vitae
145. Brown and Sharpe
146. Kansas State Teachers College
147. Ohio State University
148. Milwaukee Vocational School
149. Bonser
150. Gutenberg
151. Friese
152. Warner
153. printing
154. Newell
155. $\frac{X}{2}$
156. Tulsa
157. readiness, exercise, effect
158. New Britain, Conn.
159. Day
160. Selvidge
161. ligature
162. Los Angeles
163. Indiana
164. Indianapolis
165. Cleveland
166. soft alloy bearings
167. Oregon Agricultural College
168. Iowa State Teachers College
169. Cincinnati
170. Strickler
171. University of California
172. 14
173. Boston
174. Los Angeles
175. efficiency engineering, job analysis
176. circle
177. Pennsylvania State College
178. type faces, printing
179. University of North Dakota
180. Parsons
181. Proffitt
182. University of Michigan
183. Edgerton
184. 3–6
185. Philadelphia
186. Warner, others
187. Massachusetts Institute of Technology
188. Michigan
189. 5 in.
190. Bennett
191. 20
192. practical arts
193. University of Michigan
194. Willard E. Givens
195. Schweickhard
196. Harvard
197. New York University
198. Cleveland
199. Struck
200. Carnegie

THE MORTISE-AND-TENON JOINT—IV

John E. Doren, High School, Eureka, California

(Continued from page 313, October, 1935)

Applications to Plain, Square-Edged Material

A. The Through Tenon

The through tenon may be applied to any work that may be tenoned, and where the mortise and tenon are cut entirely by hand, the through mortise-and-tenon usually proves to be the strongest and most satisfactory. The tenon is commonly made about ¼ in. longer than the width of the adjoining member. This is done to permit the end to be chamfered all around; this chamfering is necessary to permit the end of the tenon to pass through the mortise without catching and tearing out splinters as the end emerges from the mortise.

The through tenon permits of easy wedging, if wedging is necessary or desirable. A properly wedged joint cannot be pulled apart even when no glue is used in the assembling. By the wedging, the relative position of the two members joined may also be controlled.

If wedges are to be used, both the mortise and the tenon should be especially prepared to receive them. The mortise

should be enlarged by the shaping of the end walls as illustrated below, and the enlarged part should extend to about the middle of the mortised member.

The tenon should be prepared with two saw cuts or slots near the two edges as shown in Figure 19.

The effect of the wedges will be to spread the tenon to fit tightly against the end walls of the mortise. All wedges driven into tenons should be so placed that the expanding of the tenon will be against the end walls of the mortises. If a tenon is expanded against the side walls of a mortise, the mortised member is likely to be split and ruined.

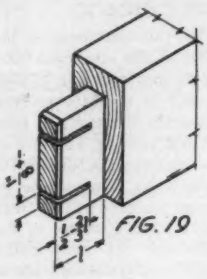


FIG. 19

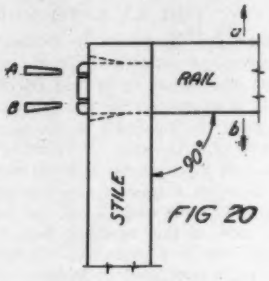


FIG 20

With all good work, it is essential to keep the adjoining members of the work in the right position relative to each other; that is, the proper angle between them must be maintained. If wedge A, Figure 20, is driven to its full depth, the angle between the two members will be altered; the angle will be increased for the rail will move up as indicated by the arrow at *a*. Likewise, if wedge B were driven to its full depth before wedge A is driven at all, the angle between the members will be decreased and the rail will move downward as indicated by the arrow at *b*.

When wedging a tenon, both wedges should be driven simultaneously, and the relative position of the members should be constantly checked as the driving proceeds. The angularity may be altered by driving one wedge or the other, as occasion requires, until both wedges have been driven home.

B. The Application of the Full-Width Tenon or Common Tenon to Commercial Work

1. *The Double-Shouldered Tenon.* This tenon may be of the long type to pass entirely through the mortised member, the blind type as ordinarily used, or the stub type. If the width of the tenon is equal to the full width of the stock, it is called a *full-width* or common tenon. Such a tenon is illustrated in Figure 9.

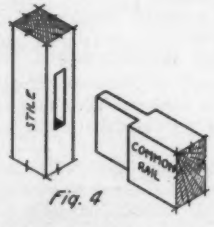


Fig. 4

Fig. 9

NOTE: Tenons are dimensioned the same as lumber. The thickness (*t*) is the lesser dimension across the grain; the width (*w*) is the greater dimension measured across the grain; the length (*l*) is always measured in the direction of the grain and may be either greater or smaller than the width.

Figure 4 shows a full-width tenon as it would fit into a mortise that is located somewhere between the ends of a stile. This tenon is called a *common* tenon because it is the variety of tenon that is best adapted to the common rails. Common rails are those rails of a framework that join the stiles at some point other than at the ends; rails that join the stiles at the ends are called *end rails*. Common rails are distinguished largely by the fact that their two edges are both plain or both molded, and the tenons are made the full width of the stock.

Figure 5 shows a full-width tenon as applied to a corner joint, i.e., the joint between a rail and end of a stile. This application of a full-width tenon is more or less common in millwork. It is often used for joining the meeting-rails with stiles of lower sash for double-hung windows. A full-width

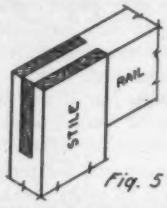


Fig. 5

Fig. 6

tenon at a corner must be matched with a full open mortise, a type of joint that is not recommended.

An application of a full-width tenon but of less common use than the last is the application to a corner joint in which the stile has an open-end mortise, sometimes called a *half-blind* mortise. See Figure 21. This variety of joint is used on cheap work only; it is not recommended where accuracy in assembling and strength are desired. With a joint of this variety, the edge of the rail should finish flush with the end of the stile. There is always danger that the tenoned member may slip during the assembling and the edge protrude beyond the end of the stile. Again, due to the moisture in the glue, the corners of the stile sometimes spread and require a clamp to hold them together as indicated by the arrows.

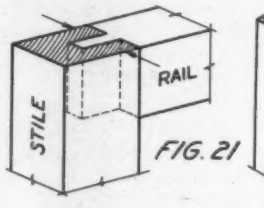


FIG. 21

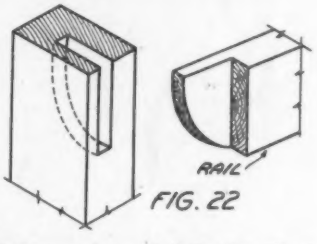


FIG. 22

2. *The Single-Shouldered Tenon, also called the Bare-Face Tenon.* Figure 6. The full-width tenon is sometimes made with but one shoulder and is used only where cheap or inferior construction is permissible. When this joint is closed, it resembles somewhat the joint shown in Figure 21, because the mortise is open at the end, although the mortise, so called, is not a true mortise but merely a "spot" cut out with a dado head as indicated by the dotted lines in Figure 22. When a mortise is spotted out in this manner, the tenon must also be trimmed away to permit the rail to fit into the required position without leaving any open or unfilled parts of the mortise exposed to view. This is very cheap construction and not at all satisfactory, but is used where low cost of production is more important than quality.

Some Questions Answered

CLEANING CORK BULLETIN BOARDS

996. Q.: Can you tell me what to use on a green cork bulletin board that has been marked with chalk erasers? — *C.G.W.*

A.: The chances are that a cloth wet with gasoline will do the trick. In case it does not, use a 5-per-cent solution of hydrochloric acid to wipe the board. After drying, apply a coat of white shellac 1 part and alcohol 7 parts. No trace of the shellac should appear. — *Ralph G. Waring.*

ASH AND HACKBERRY WOOD

997. Q.: Could you give me any information in regard to ash and hackberry wood? We are going to make baseball bats and all kinds of handles out of the wood mentioned above. We would like to know just how to finish this wood. Any information that you could give me would be highly appreciated. — *B. D.*

A.: You will find that both ash and hackberry are suitable for tool and bat handles if carefully selected for the individual purpose. Both woods will be found to have some trees which produce hard, close-grained suitable material, while others of coarser texture will prove to be brash and weak.

Properly dried, both will be tough, but if the kiln-drying is unduly forced, they are likely to prove unsatisfactory, especially as bats. In either case, do not dry below 7 per cent, with a maximum of 10 per cent. Kren, the bat manufacturer to whose shop come Babe Ruth and his contemporaries, finds that the specially selected comb-grain stocks should be roughed out as squares, cribbed up in a warm, dry loft for six months or more, rough turned to within ¼ in. and then slung in hammocks in a warm loft for another three months before they are finish-turned. This is necessary to avoid the inevitable flattening which occurs when bats are finish-turned the first time in the lathe. Commercially, the dry kiln will offset some of this time element.

As far as the finish is concerned, perhaps a combination stain and filler, made on a lacquer-binder base, will prove the most satisfactory. This can be applied while the bat is in the lathe, the filler applied at 600 r.p.m. and forced into the pores with a rag pad. After a few hours' drying, the bat may then be varnished, by spray or brush. Generally one coat will be sufficient. A high gloss finish is not desirable. If the tool handles are to be made in quantity, they should be finished by tumbling in a rotating barrel. — *Ralph G. Waring.*

LACQUER APPLIED OVER OIL STAINS AND FILLERS

998. Q.: We have found that after some pieces have been finished by applying lacquer over oil stains and fillers, there is a bleaching-out after a period of about a year. The steps we follow in finishing are:

1. Fill with paste wood filler and let stand for 24 hours.
2. Apply oil stain and let dry 24 hours.
3. Brush or spray on one coat white shellac. When dry, rub down lightly with fine steel wool.
4. Spray on two or three coats of lacquer. Rub the last coat with rottenstone and rubbing oil, using felt pad.
5. Clean up with lacquer polish.

I assume that where this difficulty shows up in the pores of the wood, that the filler has been affected. This trouble does not seem to appear on projects that do not require wood fillers even though oil stains are used. I wonder if it is possible that in rubbing down the shellac coat there might be places where this coat has been rubbed through with the result that the lacquer has caused some chemical change or bleaching of the filler. I don't understand, however, why such a long period of time should elapse before the difficulty is apparent. — *T. A. T.*

A.: The bleaching action of lacquer over shellac has been known for some time. This is occasioned by the solvents of the lacquer penetrating the thin sizing coat of shellac, becoming absorbed by the filler and eventually, in the presence of light, producing a bleaching action on the color in the filler. This is especially evident if the latter is partially colored with oil-soluble dyes, which in their turn are at the best only partly lightproof.

In the second phase of this effect of bleaching there is some evidence that a condition known in the finishing trade as "bridging" may have occurred. In this case the shellac has covered over the pores, the filler has sunk below this covering, and the light passing through the finish film is refracted to give a gray cast in the pore.

If you have a copy of *Principles of Mill and Paintshop Practice* at hand, study the chapter on filler make-up and application. You may need to change your filler formula. — *Ralph G. Waring.*

Associations, Conventions

THE A.V.A. TO MEET IN CHICAGO

Plans are being rapidly completed by the chairmen of local arrangements committees for the meeting of the American Vocational Association, to be held December 4, 5, 6, and 7 in Chicago.

The headquarters for the convention will be the Stevens Hotel.

Among the highlights of the convention are the visits to points of interest in the city. Universities, technical colleges, and city and suburban high schools will be visited. Agricultural teachers will be taken on a tour of the International Stock Show to be held during the same week. Trade and industrial teachers will be treated to a sight of the important manufacturing plants, many of them world-famous. Commercial teachers will view the latest methods and equipment used in modern offices. Home-economics teachers may learn much from visits to the shopping district on State Street and Michigan Boulevard. An interesting feature at the meeting will be a dynamic school exhibit where visitors can watch students actually at work on projects of all kinds.

The list of speakers for the general and sectional meetings, luncheons, and banquets will be announced later.

The theme of the convention will be "Vocational Education for a Better Balanced Life."

Personal News

¶ Mr. George C. Decker, formerly head of the industrial-arts department in the Fairview High School, Dayton, Ohio, has become a member of the educational staff at the State Teachers' College, Buffalo, N. Y.

¶ Mr. Anthony T. Stavaski, formerly instructor in printing in the high school at Greenfield, Mass., has been appointed professor of printing in the State Teachers' College at California, Pa.

¶ Mr. Raymond W. Phipps has been appointed as director of the laboratory of industries program for the high school at Lake Forest, Ill. This laboratory has adequate space in a new building, has $5,000 worth of new equipment, and is intended to become a community center for the district.

¶ Mr. John R. Ludington has entered the Ohio State University where he is working for his doctor's degree.

¶ Mr. E. W. Bollinger, of Grand Forks, N. Dak., has enrolled at the Ohio State University, where he is pursuing work on his doctor's degree. He will also have charge of some classes.

¶ Mr. Walter R. Williams, formerly of Norwood, Ohio, has gone to the University High School at Minneapolis, Minn., where he will develop an integrated program in industrial arts and home-economics education.

¶ Mr. Cornelius Abbott, formerly supervisor of industrial education at Laporte, Ind., has become educational director at the Indiana Boys' School, Plainfield, Ind. He succeeds Herbert A. Klein.

¶ Mr. E. E. Miller has taken the position of director of industrial arts at Taylor, Tex.

¶ Mr. J. H. Ratcliff has been appointed director of industrial arts in the Bowie High School, El Paso, Tex.

¶ Mr. W. S. Glenney has become director of industrial arts in the Poe Junior High School at San Antonio, Tex.

¶ Mr. E. W. Fowler has become director of industrial arts in the junior high school at Amarillo, Tex.

¶ Mr. M. U. Barton has assumed the position of director of industrial arts in the junior high school at Taylor, Tex.

¶ Mr. G. L. Fling has become instructor in patternmaking in the vocational and technical school at San Antonio, Tex.

(Continued on page 6A)

THE AMERICAN "IDEAL"

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No. 9190

SPECIAL FEATURES

1. Cabinet contains one No. 2701 blank case, thirteen No. 2735 California job cases, and two No. 2765 Wells two-font cases. All cases full size.
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4. Open front gives free access to cases without disturbing pupils who may be setting type.
5. Double overhead lead and slug rack providing, on each side, for two 10-lb. fonts 2-pt. leads, 4 to 25 picas by picas, and one 25-lb. font 6-pt. slugs, 4 to 25 picas by picas.
6. Height of cabinet from floor to lower edge of working surface, 39 inches. Total height from floor to top of lead and slug rack, 57 inches. Floor space, 42x26 inches.
7. Sanitary base permits keeping floor clean under cabinet.
8. Working top overhangs 3 inches on each side, providing comfortable knee clearance for pupils working at the case.
9. Substantial construction of hardwood with flat varnish finish.
10. Where desirable, cabinet may be ordered without overhead lead and slug rack, and with lead and slug case.
11. Double working-bank top with or without lead and slug rack may be attached to No. 9178 American School Type Cabinet.

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(Continued from page 352)

¶ MR. SAMUEL ANASTATIA, of Dorchester, Mass., has been appointed as shop instructor of the vocational class in the Stacy School, Milford, Mass.

¶ Tribute was recently paid by the school board and Supt. G. I. Clapp, of Woburn, Mass., to the work of the late Gordon W. PINNEY, industrial-arts teacher in the high school, who died recently. Mr. Pinney was responsible for the arrangement of the department in the new school and had developed it into one of the best in the state.

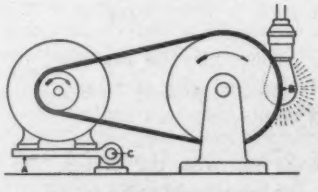
SchoolShopEquipmentNews

NEW WALLACE NO. 46 PORTABLE LATHE

J. D. Wallace and Company, 134 S. California Ave., Chicago, Ill., have just developed their new type No. 46 portable lathe. It is a nine-speed lathe with ample power provided by the Wallace cradle drive. The slow, full-powered speed makes it practical and safe to turn 30 in. on the faceplate. Between centers the capacity is 36 in., 5-in. diameter over the tool rest, and 7½ in. when using the floor stand.

No. 46 Portable Lathe

The line cut shows just why the cradle-motor drive is superior to the fixed-motor drive. In this cut the cradle motor is shown belted to a driven pulley. The electric light is placed directly behind a point where the belt contacts the face of the driven pulley. If the motor is blocked up at point A, the cradle-motor drive is converted into the fixed-center drive. If, now the apparatus is run at high speed, light will show between the pulley face and the belt at point B. There is really an air gap, due to the fact that the centrifugal force built up in the belt itself causes the belt to throw outward from the pulley face, and the contact therefore is poor and power is lost.



The Cradle-Motor Drive

If, however, the blocking at A is taken away so that the cradle-motor drive can operate properly, no light will show, at any speed, between the belt surface and the pulley face. In other words, full power is transmitted at all times.

The motor is shifted to line up each of the three motor pulleys with the three on the headstock. A special ball-bearing adjustment is provided to raise and lower the motor unit to allow for varying the center distances.

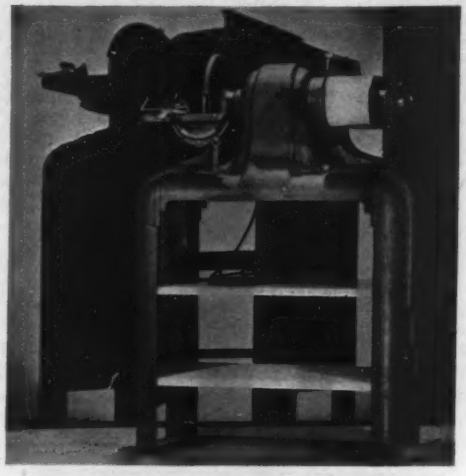
(Continued on page 11A)

ADVERTISING PAGES REMOVED

(Continued from page 6A)

NEW YATES-AMERICAN WOODWORKING MACHINES

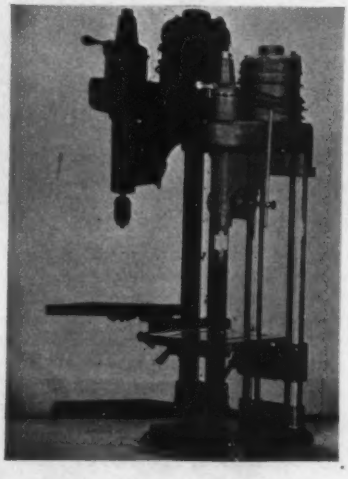
The Yates-American Machine Company, Beloit, Wisconsin, is announcing a new line of power woodworking machines for the school shop and for the home workshop. These new machines, designed by a firm that has been building woodworking machinery for over 53 years, embody numerous novel though tried and proved features. The machines are of the lighter type, designed to supplement the work of heavy equipment in schools or to satisfy the need for woodworking machinery in those schools which have limited appropriations.



Combination belt and disk sander on modernistic base

Among the machines comprising this new line are two circular saws, three jointers, two band saws, two jig saws, one shaper, two drill presses, one disk sander, one belt sander, one tool grinder, one combination lathe, one drill press, and one lathe.

While these machines are smaller in size than the industrial machinery used in factories, nevertheless, they contain the ruggedness, the long life, the precision, as well as many other features, especially those of speed control, found in the larger woodworking machines which have made the name Yates-American a byword among craftsmen in wood.



Bench-type drill press

What is of utmost importance, especially in school machinery, is the fact that safety was given first consideration in the design of this new line of machinery. A new and novel method of driving the machines has eliminated exposed belting. It has also eliminated the danger and inconvenience of shifting belts for changing speeds. All moving parts on the machines are fully inclosed or carefully

(Continued on page 12A)

FACTORY EQUIPMENT

by J. W. ROE and C. W. LYTLE

Both Professors of Industrial Engineering, New York University

JUST OFF THE PRESS

A great and progressive state Industrial Education Society recently devoted its annual convention to inspection trips in a famous industrial area. The official program stated, "too often teaching methods remain stagnant, but science and invention move on. May we hope that industrial arts and vocational education teachers . . . keep up with the modern trends as successfully as industry is doing".

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Catalin works as easily as a hard wood or a soft brass—is waterproof, acidproof and fireproof—comparatively unbreakable—and is obtainable in complete project kit form or in rods, sheets and cylinders, whole or in part. Perfectly suited to classroom work and class consumption, it stimulates the creative instinct.

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(Continued from page 11A)

guarded. Furthermore, these safety features are built in as integral parts — they are not accessories.

A special feature of this new line is the ingenious multispeed drive with a speed range from 800 to 4000 r.p.m. on the lathe and drill press, and from 700 to 1800 r.p.m. on the jig saw. Unlike other types of drives, the multispeed does not restrict the operator to 3 or 4 set speeds. Any desired intermediate speed which is safest and most efficient for any given operation is instantly available to the operator, without stopping the motor. An effortless shift of the conveniently located control lever is all that is required, thus bringing "fingertip speed control" to the school shop.

Besides building safety, ruggedness, precision, ease of maintenance and convenience of operation into each of the machines of this new line, the Yates-American engineers have gone a step further and included artistic beauty, thus pointing the way to a new trend in machine design. The entire appearance of the machines gives a subtle suggestion of refinement and quality. Their smooth surfaces, unbroken by sharp corners or crevices, are kept clean easily. The main thing, however, is that these machines are not only beautiful and in the modern trend, but they represent the acme of safety and utility.

NEW LOMBARD TOOL GRINDERS

Two new types of tool grinders, designed for trade school shops and suitable for grinding woodworking tools, have been placed on the market by Lombard & Company, 100 Middlesex Ave., Somerville, Mass.

These machines have been designed to reproduce on a small scale, the conditions and technique used by the manufacturers of fine tools and cutlery. One is a bench type, using Nova Scotia stones 14 by 2 in. in size, and the other is a larger floor type, with stones 24 by 3 in. in size.

Both grinders are fitted with a special patented tool holder, which insures perfect bevels and edges. The use of Nova Scotia stones 14 by 2 in. prevents burning and spoiling of tools. The special advantage of these grinders is that they induce appreciation of sharp tools and encourage the student in keeping tools sharp. There is no possibility of injury to eyes or hands through careless operation.

Complete information and prices will be sent to any shop instructor upon request.

ANNOUNCE NEW THURSTON CATALOG

The Thurston Supply Company, Anoka, Minn., has issued its twenty-first annual catalog of "hard-to-get" materials for manual-training classes.

The catalog contains 68 pages, devoted to leather and upholstery supplies, electrical equipment, decalcomania transfers, clock movements, inlay panels, chair-caning materials, art-fiber-weaving materials, cedar-chest supplies, and includes a complete line of hardware supplies, stains, wood finishes, glues, shellac, varnish, and steel wool.

A copy of the catalog will be sent to any shop instructor upon request.

ADVERTISING PAGES REMOVED

New Publications

Automobile Service Shop Management

By C. Edward Packer and J. A. Ahlers. Cloth, 151 pages, 5¾ by 8¼, illustrated. Published by the American Technical Society, Chicago, Ill.

This book is a manual for service managers, shop owners, and mechanics. Working in service stages, it describes management, accounting, merchandising, advertising, and method of laying out the shops and grounds. This book contains good course material to be added to the ordinary auto-mechanics course.

Circles and Squares — Book Two

By Marguerite Marquart and Jean T. Mitchell. Paper, 80 pages, 7½ by 10⅞, illustrated. Price, 60 cents. Published by World Book Company, Yonkers-on-Hudson, N. Y.

Book II of this series is a worthy successor of Book I. Its aim is to teach perspective of rectangular objects. The subjects chosen to illustrate the different steps are very interesting, and the authors have in a masterly way reduced their directions to short, easily understood statements.

Railway Engines of the World

By Brian Reed. Cloth, 159 pages, 5¾ by 3⅞. Price, $1.75. Published by The Oxford University Press, New York City.

Into this interesting book the author has put all of his love for these powerful engines of transportation as well as his deep understanding of the subject. Through all of the descriptions, the pride of British ascendency in the field of rapid locomotion is apparent. The book, though it consists of only 159 pages, contains descriptions of all of the main European and American locomotives, down to the light-weight streamlined steel Burlington Zephyr.

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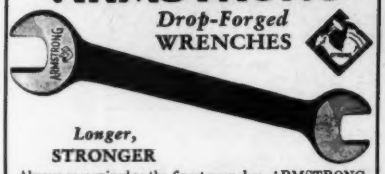

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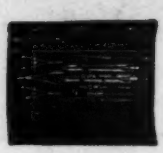

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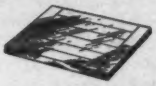

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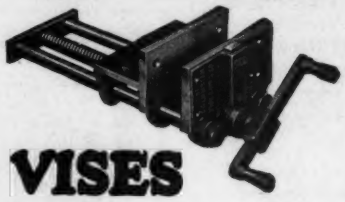

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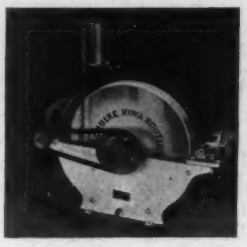

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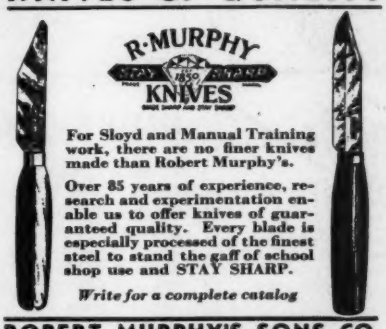

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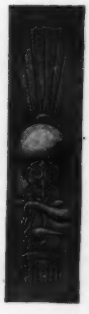

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